

APPENDIX A

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APPENDIX A-1
1999 PROGRESS REPORT FOR THE SOAP MITIGATION
PLAN IMPLEMENTATION AND
MITIGATION OF POTENTIALLY IMPACTED
SPRINGS AND SEEPS

DATE: February 2, 2000

MEMO TO: SOAP Interdisciplinary Team Members

FROM: Janice Stadelman

SUBJECT: 1999 Progress Report for the SOAP Mitigation Plan Implementation

ACTIVITY	TARGETED COMPLETION DATE	STATUS	REMARKS
Reclamation Test Plot Program	April 1994	Completed 1995 - ongoing due to results/changing technology	
Mitigation Surety	April 1994	Completed	
Conservation Easement (Maggie Cr. Watershed Restoration Project-Middle Maggie Creek)	April 1994	Completed	Recorded with Eureka County Recorders Office in October 2000 Book 338 pages 476-495
Fencing - Livestock Grazing Pastures	11/18/94	Completed (1994-1996) construction of following fences (*): * Chicken Springs * Drift * Northern Native * Lower Simon Creek * Boulder Valley Wetlands * Rainbow - Haskell Bench (see "Remarks" note)	-Haskell Bench Fence will be constructed only if a problem occurs with the grazing pastures in the future.
Water Gaps - #1-3 along middle Maggie Cr. & 1 above narrows and associated wells #1-3 along middle Maggie Creek	11/18/94	Completed 1995-1996 (Summary of action: - fencing completed in 1995 - wells #1 & 3 drilled in 1995; #2 drilled in 1996; water systems installed in 1996)	Wells & water systems all installed on private lands.
Upper Simon Creek Fence/Haul Road Wildlife Laydown Fence	11/18/94	Completed 1995	
North-South Haul Road Livestock Water Systems	1994	Completed 1994-1995 (Summary of action: wells drilled in 1994; installation of water systems completed in 1994-1995)	
Susie Creek Fence (8 miles)	11/18/94	NOT COMPLETED Newmont constructed approximately 2 miles of fence; no change in grazing management	Not completed due to land ownership issues on private lands; note next item in table

ACTIVITY	TARGETED COMPLETION DATE	STATUS	REMARKS
SOAP Mitigation Plan - Newmont/BLM role on Maggie Creek Ranch controlled lands		unresolved	
Sand Dune Spring Riparian Study Preserve - Fencing	9/30/94 Summary of action: fencing completed in 1994	Completed 1994	One large area fenced around springs due to saturation of ground and accessibility. This is the Boulder Valley Wetlands Fence
Carlin Polishing Wetlands Area (110 acres)	Summary of action: construction completed in 1994; seeded in 1995	Completed 1994-1995 - 13 acre wetlands created near Carlin	Cultural report for area BLM 1-1825(P); 2 eligible cultural sites CrNV-12-11783 & CrNV-12-11784
Livestock Grazing System(s); pastures involved are listed below -Lower Northern Native Pasture -Upper Northern Native Pasture -Chicken Springs -Haskell Bench -Horse Pasture -Drift Pasture -Simon Cr. -Jack Cr. -Little Jack Cr. -Coyote Cr. -N. Native Pasture	Annually	Completed - ongoing	- Restoration areas were grazed in 1997, which was very successful
Riparian Monitoring - selection Third Party Consultant	Ongoing	Completed for 1994 and 1996 Pasture Evaluations/ Monitoring years. - Ongoing	
Riparian Monitoring Stations & Data Collection (1982.8 acres)	Ongoing	Completed in 1994 and 1996. Continue to monitor and collect data	
Riparian - Aerial Photographs	Ongoing	Completed for 1994 and 1995. - Ongoing	Kept w/3809 File
Assessment of the Functional Condition of each Pasture/ Riparian Zone	Ongoing	Completed for 1994 (baseline) and 1996. Continue to monitor	
Planting - 100 saplings (Middle Maggie Creek)	Summary of Action: planted 600-700 cottonwood seedlings	Completed	

ACTIVITY	TARGETED COMPLETION DATE	STATUS	REMARKS
Improvement of stream/riparian habitat conditions on Lower Maggie Creek	Ongoing	Ongoing - reduction in scope	Elko Land & Livestock now grazes pastures H1-H7 that are below the narrows
Sand Dune Spring Irrigation Channel Water Diversion		Completed	Situation has undergone several changes due to Barrick's de-H ₂ O program
Lower Maggie Creek Stream Channel Stabilization Measures & Water Cooling System	Fall 1994	Stream Channel Stabilization completed. Construction of Cooling System completed	
Maggie Creek Flow Augmentation Water Distribution System - Design	December 1994	Completed	
Maggie Creek Instream Structures		Not Completed; BLM decided against installation of structures and advises dropping this item	
Water Discharge into Maggie Creek	Bi-weekly inspections	- Ongoing	NPDES Permit
Groundwater Monitoring Wells - MAG A, B, C, D - PAL 4, MYC 4 - p. 20, Table II-1	11/18/94	Completed installation of all wells. Monitoring is ongoing	PAL-4 relocated near PAL-1 & 3A
Seeps & Springs - 25 sites (14 acres)	Ongoing	Completed w/noted exception. Sites were evaluated in 1994, except JC 4 & 5. - Springs all fenced in 1995. Developed & installed water systems in 1996. *Spring sites JC 4&5 still need field visit evaluations	Fenced spring areas: - Flat Spring - Cherry Spring - Mud Spring - James Creek - Soap Creek Fenced &/or developed springs: #32 & 37 along Marys Mountain, provide they have water; #16 not to be fenced
Marys River Stock Watering Well #4		Completed	2 wells installed in 1993/1994 at cost \$19,000
Funding District Hydrologist - \$30,000	Annually	Completed	
Protection of Goshawk Nest - Fencing	N/A	N/A	BLM determined fencing unnecessary at present; continue to monitor
Overhangs & Alcoves in Final Pit Highwalls		NOT COMPLETED	under BLM consultation; can't be completed until pit in final stages/closure

ACTIVITY	TARGETED COMPLETION DATE	STATUS	REMARKS
Dunphy Hills Seeding Project Phase I	Winter 1993	Completed March 1993	Approximately 1297 acres seeded. Dunphy Hills Seeding Project was mitigation for the Newmont Tailing Impoundment 2/5 EA
Dunphy Hills Seeding Project - Phase 2	Fall 1995	Completed Winter 1995	Approximately 570 acres seeded, 90 acres public & 480 acres private land
Dunphy Hills Seeding Project - Phase 3	Fall 1996	Completed Winter 1996	Approximately 1300 acres of private land seeded
Dunphy Hills Seeding Project - monitoring site establishment & data collection	Ongoing	Continue to monitor public lands	
Sagebrush Seeder -donated to NDOW	Upon completion of seedings	Completed 1996; Elko Land & Livestock/ Newmont donated to NDOW	
Seeding - 800 acres transition range for mule deer habitat losses from open pits	Fall 1996 - Bob's Flat EFR & Mule Deer Mitigation Project (JDR# 6014) GPS surveyed public land acreages: greenblock = 949 acres core block = 970 acres	Completed 1997 Approximately 1919 acres of public land seeded; approximately 2300 acres private land seeded. Also planted Wyoming big sagebrush and fourwing saltbush tublings.	Projects mitigated by these seeding acreages are 800 acres SOAP EIS + 300 acres Bootstrap EIS + 211 acres Section 36 EA + <u>75</u> acres Lantern EA 1386 acres used; + 533 acres banked as credit (available acres) for future mule deer habitat mitigation
Lynn Creek Ponds - monitoring for bats	N/A	BLM recommends this item be dropped from the mitigation plan since the ponds washed out from spring run-off in 1993.	
MCBMP Report	Quarterly	Ongoing	
Seeps & Springs Report	Semi - annual	Ongoing Newmont proposed change to "fall monitoring only"	
Hydrographs Reported	Monthly	Ongoing	
Hydrogeologic Model Monitoring Report	Annually	Ongoing	
Cultural Reports for Mitigated Sites -haul road	* Section 106 (public land) - Reports due no later than 1 year from completion field work (private land)	Completed All 4 sites have been mitigated. BLM received & accepted both reports in 1999. Report numbers are BLM 1-1756(P) & BLM 1-1773(P)	

ACTIVITY	TARGETED COMPLETION DATE	STATUS	REMARKS
Maggie Creek Cultural Site Monitoring - CRNV-12-11723	Periodically during water discharge	Ongoing	

**Table II-2
Mitigation of Potentially Impacted Springs and Seeps
Updated March 2001**

Group	Location¹ TN/RE Section-¼, ¼	Newmont Inventory No.²	Description³	Mitigation
Springs Within 10 ft. Drawdown Contour and Not Adjacent to Spring Domains				
1	35/51-18-SE,SE	55	Simon Creek tributary; <1 gpm; no flow; not feasible for development; no enclosure proposed	Guzzler
1	35/51-30-SE,SE	Spring 2	Pond at base of spring; 1 gpm on BLM spring; limited riparian potential; no enclosures or developments proposed	4-inch well
1	35/51-32-NW,NW	Spring 3	Group of 2 springs and pond; <1gpm; limited to nonexistent flow or riparian potential; no enclosure or development proposed	4-inch well
1	34/51-10-NW,SE	57	Series of Springs feeding wet meadow; 20-30 gpm; included in enclosure	4-inch well
Springs Adjacent to Spring Domain Boundaries				
1	35/51-18-SE,NW	54	Simon Creek tributary; <1 gpm; no flow; not feasible for development; no enclosure proposed	Guzzler
1	35/51-30-NE,SE	56	On BLM spring list; no flow; not feasible for development; no enclosure proposed	Guzzler
1	343/512-6 1-NW,SW NE,SE	JC5 (58)	Group of springs on hillside; <1 gpm; need field evaluation	4-inch well (co-located)
1	343/51-61-SW,NWSE,NE	JC4 (59)	Spring leading to meadow; 1 gpm; need field evaluation	4-inch well (co-located)
2	34/51-29-SW,SE	Spring 14	Series of springs flowing to 3 ponds; 20 gpm; two enclosures incorporating 3 springs constructed	4-inch well
2	34/51-33-NW,NW	Spring 16	Seep on hillside; pond ¼-mile downstream; <1 gpm; not feasible for development, enclosure constructed	
3	35/51-9-NE,NE	JC1 (17)	Spring in channel near James Creek; 2-3 gpm; no proposed development; spring complex; enclosure constructed, needs modification	2-inch well
3	33/51-10/NW,SW	JC2	Series of springs near James Creek; PWR; <1 gpm; enclosure constructed incorporating 2 of 3 springs	Guzzler
3	33/51-10-SE,NW	JC3	Hillside spring; <1 gpm; enclosure constructed; no development proposed	
3	33/51-10-NE,NW	Spring 20	Altered spring on top of hill; 2-3 gpm; enclosure constructed; no development proposed	Guzzler
3	33/51-10-SW,NW	Spring 21	3 springs flowing to James Creek; PWR; 30-40 gpm; enclosure constructed; no development proposed	6-inch well
3	33/51-15-SW,NW	Spring 31	Willow grove and meadow; 1-2 gpm; enclosure expanded	2-inch well
3	33/51-21-NW,NE	Spring 32	<1 gpm; enclosure and development completed	

Table II-2 Mitigation of Potentially Impacted Springs and Seeps Updated March 2001				
3	33/51-21-SE,NE	Spring 33	1 – 3 gpm; not feasible for development, no enclosure proposed	Guzzler
3	33/51-21-SW,SE	Spring 34	Cherry Spring; artesian spring; 2 ponds; 1+ gpm; enclosure expanded	2-inch well
3	33/51-28-SE,NW	Spring 26	Seep at confluence of 2 drainages; <1 gpm; not feasible for development, no enclosure proposed	Guzzler
3	33/51-33-NE,NW	Spring 35	Seep on hillside; < 1 gpm; not feasible for development, no enclosure proposed	
3	33/51-33-NE,NW	Spring 36	Seep on hillside; < 1 gpm; not feasible for development, no enclosure proposed	Guzzler
3	33/51-33-SE,NW	Spring 37	Seep on hillside; < 1 gpm; Enclosure constructed	
3	33/51-33-SW,NE	Spring 38	2 hillside springs flowing to breached pond; 2-3 gpm; not feasible for development, no enclosure proposed	2-inch well
3	33/51-33-NW,SE	Spring 39	Seep draining to pond; < 1 gpm; enclosure constructed; not feasible for development	

APPENDIX A-2
RIPARIAN MONITORING ANALYSIS SOAP MITIGATION PLAN
MAGGIE CREEK WATERSHED RESTORATION PROJECT
1997 AND 1999

***Riparian Monitoring Analysis
South Operations Area Project Mitigation Plan
Maggie Creek Watershed Restoration Project
3-18-97***

Prepared by Elko District, BLM

INTRODUCTION

As mitigation for their South Operations Area Project (SOAP), Newmont Gold Company in conjunction with the Elko District Bureau of Land Management (BLM) and Elko Land and Livestock Company, developed the Maggie Creek Watershed Restoration Project (MCWRP) to improve stream and riparian habitat conditions within the Maggie Creek subbasin. Provisions for implementing the project are included within the Mitigation Plan (Appendix A) for the Final SOAP Environmental Impact Statement (EIS) completed in 1993.

The SOAP Mitigation Plan provided for an initial period of rest from grazing for key stream and riparian habitats. Grazing will be re-initiated in some of these areas once conditions have improved to levels established in the Mitigation Plan.

PURPOSE

The purpose of this report is to evaluate improvement in stream and riparian habitat conditions within the MCWRP area occurring since the Mitigation Plan was implemented in 1993 and to determine whether riparian restoration zones can be grazed starting in 1997.

ANALYSIS FRAMEWORK

This analysis is based on stream surveys conducted in the Maggie Creek subbasin by BLM (and in some cases the Nevada Division of Wildlife) in 1980, 1986, 1977, 1989 and 1992 and by EIP Associates (EIP) in 1994 and JBR Environmental Consultants, Inc. (JBR) in 1996. Both the EIP and JBR surveys were contracted by Newmont.

The monitoring program established in the Mitigation Plan was set up to take advantage of comparative data collected by BLM in previous years. Although comparisons between the 1994 and 1996 data were made by JBR, this report also compares current conditions to conditions existing prior to implementation of the Mitigation Plan. It is important to recognize 1994 data represent almost two growing seasons of rest. With few exceptions, older BLM data represent conditions associated with growing season-long grazing on an annual basis.

An attempt was made to compare data between years as much as possible, however, some of the information collected in 1994 and 1996 was not included in the earlier surveys. Also, some of the data collected in 1994 could not be used because of problems with measurement techniques or

calculation methods. Nineteen ninety-four was also one of the driest years on record and actual stream measurements could not be taken in many locations.

Station data are averaged by pasture or grazing treatment area and compared between years where data are available. SOAP monitoring stations, their corresponding BLM monitoring stations, and planned grazing strategies as outlined in the Mitigation Plan are shown by pasture in Table 1. Pasture names and locations are shown in Figure 1.

Table 1
SOAP and BLM Monitoring Stations,
Pasture Names and Mitigation Plan Grazing Strategies for Pastures Included in the
Maggie Creek Watershed Restoration Project (MCWRP) Area

Soap ¹ Monitoring Station	Blm Stream Survey Station	Pasture Name	Mitigation Plan Grazing Strategy
Maggie Creek			
MAG 1-3	None	Lower Maggie Creek (H-7)	Restoration ²
MAG 4-6	None	Middle Maggie Creek Parcel 2	Exclusion ³
MAG-7	None	Maggie Creek Ranch Controlled	Not Specified ⁴
MAG-8	S-3	Maggie Creek Ranch Controlled	Not Specified
MAG-9	S-4	Simons Pastures 1-3	Restoration
MAG-10	S-5	Simons Pastures 1-3	Restoration
MAG-11	S-6	Water Gap/Middle Maggie Creek Parcel 1	Exclusion
MAG-13	S-7	Middle Maggie Creek Parcel 1	Exclusion
MAG-14	S-8	Middle Maggie Creek Parcel 1	Exclusion
MAG-15	S-9	Middle Maggie Creek Parcel 1	Exclusion
MAG-16	S-10	Middle Maggie Creek Parcel 1	Exclusion
MAG-17	S-11	Middle Maggie Creek Parcel 1	Exclusion
MAG-18	S-12	Middle Maggie Creek Parcel 1	Exclusion
MAG-19	S-13	Middle Maggie Creek Parcel 1	Exclusion
MAG-20	S-14	Coyote Pasture	Restoration
MAG-21	S-15	Coyote Pasture	Restoration
None	S-16	Coyote Pasture	Restoration
MAG-23	S-17	Coyote Pasture	Restoration
MAG-24	S-18	Maggie Creek Ranch Controlled	Not Specified
MAG-25	S-19	Maggie Creek Ranch Controlled	Not Specified
MAG-26	S-20	Maggie Creek Ranch Controlled	Not Specified
MAG-27	S-21	Maggie Creek Ranch Controlled	Not Specified
MAG-28	S-22	Maggie Creek Ranch Controlled	Not Specified
Coyote Creek			
COY-1	None	Cow Camp Pasture	Restoration
COW-1	None	Cow Camp Pasture	Restoration

Table 1
SOAP and BLM Monitoring Stations,
Pasture Names and Mitigation Plan Grazing Strategies for Pastures Included in the
Maggie Creek Watershed Restoration Project (MCWRP) Area

Soap ¹ Monitoring Station	Blm Stream Survey Station	Pasture Name	Mitigation Plan Grazing Strategy
SPR-2	None	Cow Camp Pasture	Restoration
COY-3	None	Jack/Coyote Floodplain (Upper N. Native)	Restoration
COY-4	None	Jack/Coyote Floodplain (Upper N. Native)	Restoration
COY-5	S-1	Jack/Coyote Floodplain (Upper N. Native)	Restoration
COY-6	S-2	Coyote Canyon (Upper N. Native)	Restoration
COY-7	S-3	Coyote Canyon (Upper N. Native)	Restoration
COY-8	S-4	Coyote Canyon (Upper N. Native)	Restoration
COY-9	S-5	Coyote Canyon (Upper N. Native)	Restoration
COY-10	S-6	Coyote Canyon (Upper N. Native)	Restoration
COY-11	S-7	Coyote Canyon (Upper N. Native)	Restoration
Little Jack Creek			
LJ-1	None	Jacks Pasture 2	Restoration
LJ-2	None	Jacks Pasture 2	Restoration
LJ-3	S-1	Jacks Pasture 1	Restoration
LJ-4	S-2	Jacks Pasture 1	Restoration
LJ-5	S-3	Jacks/Coyote Floodplain (Upper N. Native)	Restoration
LJ-6	S-4	Jacks/Coyote Floodplain (Upper N. Native)	Restoration
LJ-7	S-5	Jacks/Coyote Floodplain (Upper N. Native)	Restoration
LJ-8	S-6	Jacks/Coyote Floodplain (Upper N. Native)	Restoration
LJ-9	S-7	Little Jack Creek Canyon (Upper N. Native)	Restoration
LJ-10	S-8	Little Jack Creek Canyon (Upper N. Native)	Restoration
LJ-11	S-9	Little Jack Creek Canyon (Upper N. Native)	Restoration
Simon Creek			
SIM-1	None	Lower Simon Creek Parcel	Restoration
SIM-2	None	Lower Simon Creek Parcel	Restoration

¹ South Operations Area Project.

² Livestock are to be excluded from these zones (pastures) until the biological standards for stream and riparian habitat conditions specified in the Mitigation Plan have been achieved.

³ Permanently closed to grazing.

⁴ Although grazing strategies for these lands are not specifically defined in the Mitigation Plan, the Plan does include a general commitment to improving these areas in conjunction with Maggie Creek Ranch.



Grazing strategies identified in the Mitigation Plan include restoration, exclusion, and controlled grazing. The restoration grazing strategy means that grazing will be excluded from these areas until certain biological standards for stream and riparian habitat conditions have been achieved. Exclusion means the area is permanently closed to grazing. Although pastures with controlled grazing designations as shown in Figure 1 are not included in the riparian monitoring program, these areas do have utilization restrictions and are required to be rested from grazing every third year. Grazing strategies are not specified for lands owned by Maggie Creek Ranch, however, the Mitigation Plan includes a general commitment to achieving or maintaining good habitat conditions in these areas as a cooperative effort.

The biological standards developed for restoration areas are shown in Table 2. Standards for streambank cover and stability (riparian condition class), stream width/depth ratio and width of the riparian zone were developed for stream systems, while standards for wetland (hydrophytic) plant cover were developed for nonstream habitats such as wet meadows where the stream channel is poorly defined.

Table 2
Biological Standards for Pastures with a Restoration Grazing Strategy as Defined in the South Operations Area Project (SOAP) Mitigation Plan

Pasture	Stream Criteria			Wetland Plant Cover Criteria
	Riparian Condition Class (% Optimum) ¹	Stream Width/depth Ratio	Riparian Zone Width	
Maggie Creek				
Lower Maggie Creek (H-7)	70	15:1 or 30%	30%	NA ²
Maggie Creek Simons Pastures	70	15:1 or 30%	30%	NA
Maggie Creek Coyote Pasture	70	15:1 or 30%	30%	NA
Coyote Creek				
Cow Camp Pasture	NA	NA	NA	10%
Coyote Floodplain (Upper N. Native)	NA	NA	NA	>10% (graze in conjunction with Little Jack/Coyote Canyons <10% (graze in conjunction with Chicken Springs Pasture)
Coyote Canyon (Upper N. Native)	60	15:1 or 30%	30%	NA
Little Jack Creek				
Jacks Pastures 1 and 2	NA	NA	NA	10%
Jacks Floodplain (Upper N. Native)	NA	NA	NA	>10% (graze in conjunction with Little Jack/Coyote Canyons <10% (graze in conjunction with Chicken Springs Pasture)

Table 2
Biological Standards for Pastures with a Restoration Grazing Strategy as Defined in the South Operations Area Project (SOAP) Mitigation Plan

Pasture	Stream Criteria			Wetland Plant Cover Criteria
	Riparian Condition Class (% Optimum) ¹	Stream Width/depth Ratio	Riparian Zone Width	
Little Jack Creek Canyon (Upper N. Native)	60	15:1 or 30%	30%	NA
<i>Simon Creek</i>				
Lower Simon Creek Parcel	NA	NA	NA	10%

¹ Optimum is considered totally stable streambanks with medium to heavy cover of trees or tall shrubs.

² Not applicable.

Grazing history is important to the analysis of monitoring data. Prior to implementation of the Mitigation Plan, grazing within much of the MCWRP area was growing season-long. Since 1993, significant portions of Maggie, Coyote and Little Jack Creeks have been rested from livestock, although some pastures have been grazed recently as a result of trespass cattle from Maggie Creek Ranch, gates being left opened, fence construction schedules or planned grazing on the part of Elko Land and Livestock. Grazing use is summarized in Table 3 (pastures were rested in years not shown).

Table 3
Grazing Occurring since 1993 in Monitored Pastures Within the Maggie Creek Watershed Restoration Project (MCWRP) Area

Pasture	Year	Grazing Use
<i>Maggie Creek</i>		
Lower Maggie Creek	1993-1994	Summer
Middle Maggie Creek Parcels 1 and 2	1994-1996	Limited trespass from Maggie Creek Ranch
Water Gaps	1994-96	Growing Season-long ¹
<i>Coyote Creek</i>		
Cow Camp	1996	291 head from 6/21-8/1
<i>Little Jack Creek</i>		
Jacks Pastures 1 and 2	1996	339 head from 6/17 to early-mid August
<i>Simon Creek</i>		
Lower Simon Creek Parcel	1993/94	Summer
	1995	Rest
	1996	Approx. 200 hd from June-July

¹ Although fenced, the water gaps have been available to grazing pending completion of livestock watering wells. The wells are scheduled to be on line for the 1997 grazing season.

RESULTS

RESTORATION GRAZING AREAS

Monitoring results for restoration areas are summarized in Table 4. Data on which these conclusions are based is presented and discussed in the following sections.

Table 4
Summary of Monitoring Results for Restoration Grazing Areas Based on Biological Standards Established in the SOAP Mitigation Plan

Pasture	Performance Relative to Biological Standards
<i>Maggie Creek</i>	
Lower Maggie Creek (H-7)	Not Met
Simon Pastures 1-3	Not Met*
Coyote Pasture	Not Met
<i>Coyote Creek</i>	
Cow Camp	Met
Coyote Floodplain (Upper N. Native)	Met (graze in conjunction with Coyote/Little Jack Canyons)
Coyote Canyon (Upper N. Native)	Met
<i>Little Jack Creek</i>	
Jacks Pastures 1	Not Met*
Jacks Pastures 2	Met
Jacks Floodplain (Upper N. Native)	Met (graze in conjunction with Coyote/Little Jack Canyons)
Little Jack Creek Canyon (Upper N. Native)	Met
<i>Simon Creek</i>	
Lower Simon Creek Parcel	Not Met

* Although technically not all biological standards have been met, pastures may be suitable for grazing in 1997 (see following discussion).

STREAM MONITORING

Lower Maggie Creek (H-7)

Although improvement between 1994 and 1996 has been good, biological standards have not been met for the Lower Maggie Creek Pasture (Table 5). Unlike upstream reaches, this area has only been rested from grazing since the beginning of the 1995 growing season. The level of improvement observed is reasonable for one and a half growing seasons of rest (data were collected in July of 1996). No information on stream width to depth ratio was collected for this pasture in 1994. In addition, no BLM stream survey stations were established in this area in 1980.

Summer water supply for this stream reach appears to be the result of reservoir mounding (Congdon 1997). Although upstream locations in the vicinity of the narrows were dry in July of 1994 and 1996, water was present in all or part of this reach during both the EIP and JBR surveys. In 1996, water levels were highest at MAG-1 (station closest to the reservoir) and lowest at MAG-3 (station just below the narrows). It is possible the absence of natural summer flow regimes may influence stream recovery processes and ability of the area to eventually meet existing biological standards.

Recommendation: Continue to rest for at least next two growing seasons. Re-evaluate in the third year (1999) to determine if biological standards have been met or if they need to be revised.

Table 5
Comparison of Habitat Parameters Between 1994 and 1996 for Lower Maggie Creek¹

Parameter	1994	1996	% Change
Riparian Condition Class (% optimum) ²	45	50	+11
Stream Width/Depth Ratio	na ³	44.5	na
Total Riparian Zone Width (ft)	9.8	12.4	+27
Riparian Zone Width (ft) >75% Cover	5.5	6.9	+25
Riparian Zone Width (ft) 50-75% Cover	4.3	5.5	+28
Ave. Shorewater Depth (ft)	Mostly dry	<0.01	na
Ave. Bank Overhang (ft)	Mostly dry	0.0	na
Ave. Woody Vegetation Overhang (ft)	Mostly dry	0.0	na

¹ Based on averages for stations MAG-1 through MAG-3 where data are available.

² Optimum is considered totally stable streambanks with medium to heavy cover of trees or tall shrubs.

³ Not available.

Simons Pastures 1-3 (Maggie Creek)

Improvement has been excellent for this portion of Maggie Creek (Table 6). Although riparian condition class has not quite reached the target level of 70% of optimum, the 1996 rating represents improvement of more than 140% over the 1980 and 1986 conditions. While information on stream width to depth ratio is unavailable for 1994, a comparison to 1980 and 1986 data show a decrease of more than 30%. Although increase in total width of the riparian zone was less than 30%, the portion of the riparian zone with cover in excess of 75% has increased by 42% since 1994. At the same time, width of the riparian zone with cover between 50 and 75% showed a substantial decrease. As riparian habitat conditions improve, the riparian zone is expected to become increasingly dense although outward expansion is limited by hydrology. Width of the riparian zone with 50-75% cover should decline as width of the riparian zone with cover in excess of 75% cover increases. The recent development of quality pools as well as the substantial increase in shorewater depth, also support an assessment of good habitat conditions. The only variable not showing improvement was bank overhang.

Recommendation: Initiate an acceptable grazing treatment in 1997. Acceptable grazing treatments include those which are designed to improve or maintain riparian habitats (see discussion under Conclusions). Monitor utilization in years the pasture is grazed. Re-evaluate biological standards in three years (1999).

Biological standards have been met for width to depth ratio and for riparian zone width. Although technically the riparian condition class has not achieved the target level of 70%, condition of the riparian zone has improved dramatically over conditions existing prior to changes in grazing

management. Implementation of acceptable grazing practices should not affect the ability of the riparian condition class to reach the target level of 70% of optimum within a few years.

Table 6
Comparison of Habitat Parameters Between 1980, 1986, 1994 and 1996
for the Portion of Maggie Creek Included Within Simon Pastures 1-3¹

Parameter	1980	1986	1994	1996	% Change from 1980/86
Riparian Condition Class (% Optimum) ²	25.8	25.0	49.5	62.0	+140 to +148
Stream Width/Depth Ratio	40.6	82.2	na ³	22.8	-44 to -72
% Stream Width With Quality Pools	0	0	na	48.7	Undefined Increase
Total Riparian Zone Width (ft)	na	na	26.8	32.7	+22 (from 1994)
Riparian Zone Width (ft) >75% Cover	na	na	22.4	31.8	+42 (from 1994)
Riparian Zone Width (ft) 50-75% Cover	na	na	4.4	0.9	-80 (from 1994)
Ave. Shorewater Depth (ft)	na	na	0.05	0.24	+380
Ave. Bank Overhang (ft)	na	na	0.4	0.0	Undefined Decrease
Ave. Woody Vegetation Overhang (ft)	na	na	0.0	0.0	0

¹ Based on station averages for MAG-9 and MAG-10 and for BLM S-4 and S-5 where data are available.

² Optimum is considered totally stable streambanks with medium to heavy cover of tall shrubs or trees.

³ Not available.

Coyote Pasture (Maggie Creek)

Although the riparian condition class rating of 63% of optimum is indicative of good riparian habitat conditions, biological standards have not been met for this reach of Maggie Creek (Table 7). Recent deposition of gravel bars, particularly at MAG-21, has led to a high width/depth ratio and a decline in the width of the riparian zone with cover in excess of 75%. More of the riparian zone now includes sparsely vegetated gravel bars than was the case in 1994. Results for other monitoring parameters are variable. Quality pools have both increased and decreased since earlier surveys, while shorewater depth decreased since 1994. However, the fairly significant amount of overhanging woody vegetation present in 1996 and well as the presence of undercut streambanks (bank overhang) are indicative of good or improving habitat conditions overall.

The level of bar development evident during the 1996 survey may be a stage of channel evolution resulting from upstream erosion and downstream recovery. Eroding, vertical streambanks are present upstream both within the Coyote Pasture and on private lands owned by Maggie Creek Ranch. As the riparian zone becomes increasingly dense (as is the case with Maggie Creek), the ability of high flows to transport sediment is reduced, and sand or gravel bars can form in low velocity areas. In essence, well vegetated stream reaches can act like dams or sediment sinks particularly if upstream sediment sources are high. Exposed areas should become colonized with vegetation and eventually form stable streambanks. Similar channel dynamics have been observed on other stream recovery projects in the Elko District.

Recommendation: Continue to rest for at least one more growing season. Re-evaluate in the second or third year (1998 or 1999) to determine if biological standards have been met.

Table 7

**Comparison of Habitat Parameters Between 1980, 1986, 1994 and 1996
for the Portion of Maggie Creek Included Within the Coyote Pasture¹**

Parameter	1980	1986	1994	1996	% Change from 1980/86
Riparian Condition Class (% optimum) ²	47	33.5	58	63	+34 to +88
Stream Width/Depth Ratio	20.0	31.9	na	47 ³	+135 to +47
Riparian Zone Width (total ft)	na ⁴	na	35.2	33.0	-6 (from 1994)
Riparian Zone Width (ft) >75% Cover	na	na	33.6	26.3	-22 (from 1994)
Riparian Zone Width (ft) 50- 75% Cover	na	na	1.6	6.7	+319 (from 1994)
% Stream Width With Quality Pools	74.5	4.9	na	21.3	-71 to +335
Ave. Shore Depth (ft)	na	na	0.28	0.0	Undefined Decrease (from 1994)
Ave. Shore Overhang (ft)	na	na	0	0.04	Undefined Increase (from 1994)
Ave. Woody Vegetation Overhang (ft)	na	na	na	0.21	na

¹ Based on station averages for MAG-20, MAG 21 and MAG 23 and BLM S-14 through BLM S-17 where data are available.

² Optimum is considered totally stable streambanks with medium to heavy cover of tall shrubs or trees.

³ Several individual transects had extremely high width to depth ratios resulting in a high overall average, however, a number of transects also had very low width to depth ratios.

⁴ Not available.

Coyote Canyon (Coyote Creek, Upper Northern Native)

Riparian habitat conditions are excellent for Coyote Creek within the Coyote Canyon of the Upper Northern Native pasture (Table 8). The riparian condition class has improved significantly since 1977/92 and is now nearly at optimal levels indicating streambanks are extremely stable and are densely covered with woody riparian vegetation. While the stream has become more narrow and deep since the earlier surveys, the width/depth ratio recorded for 1996 probably represents potential for this stream type. Further bank development and subsequent narrowing of the stream channel is naturally limited in this system by gradient and a lack of bank building sediments. The riparian zone has continued to expand since 1994, especially for the portion with cover in excess of 75%. The increase has significantly exceeded the standard of 30%. The high percentage of stream width comprised of quality pools is also an important indicator of good aquatic habitat conditions. Although nearly the same portion of the stream width was recorded as supporting quality pools in 1992, a review of this data suggest observer error may have resulted in an overestimation of pool quality at that time. Although information on shorewater depth, bank overhang and overhanging woody vegetation could not be compared between 1994 and 1996, the 1996 data support an assessment of improving habitat conditions.

Recommendation: Biological standards have been met. Initiate an acceptable grazing treatment in 1997 in the Upper Northern Native pasture. Monitor utilization during years the pasture is grazed. Re-evaluate biological standards in three years (1999).

Table 8
Comparison of Habitat Parameters Between 1980, 1986, 1994 and 1996
for Coyote Creek Canyon¹

Parameter	1977	1992	1994	1996	% Change from 1977/92
Riparian Condition Class (% optimum) ²	66	64	89	93	+41 to +45
Stream Width/Depth Ratio	28.7	27.6	na	24.6	-14 to -11
Riparian Zone Width (total ft)	na ³	na	12.1	20.8	+72 (from 1994)
Riparian Zone Width (ft) >75% Cover	na	na	10.3	18.9	+83 (from 1994)
Riparian Zone Width (ft) 50- 75% Cover	na	na	1.8	2.0	+11 (from 1994)
% Stream Width With Quality Pools	0	25	na	23.8	Undefined Increase to -5
Ave. Shorewater Depth (ft)	na	na	na ⁴	0.06	
Ave. Bank Overhang (ft)	na	na	na ⁴	0.04	na
Ave. Woody Vegetation Overhang (ft)	na	na	na ⁴	0.08	na

¹ Based on station averages for COY-6 through COY-11 and BLM S-2 through S-7 where data are available.

² Optimum is considered totally stable streambanks with medium to heavy cover of tall shrubs or trees.

³ Not available.

⁴ Although information on these parameters was collected in 1994, it is not clear whether the data were estimated or measured and whether or not water was present in the channel at the time information was recorded.

Little Jack Creek Canyon (Little Jack Creek, Upper North Native)

As with Coyote Creek, riparian habitat conditions for the portion of Little Jack Creek within the canyon (Upper Northern Native pasture) are excellent (Table 9). Although there has been no change in riparian condition class between 1994 and 1996, conditions have improved substantially over earlier surveys. The rating for 1996 is well in excess of the 60% standard and represents a situation of stable streambanks densely vegetated with willows. As with Coyote Creek, a width to depth ratio in the low to mid twenties appears to represent potential for this stream type. As expected, the greatest increase in the riparian zone width is for the portion with cover in excess of 75%. The decline in the portion with cover between 50 and 75% should occur as plants continue to fill in open spaces. Results for percent of stream width in quality pools are variable. More quality pools were encountered in 1989 than any other year. Although comparative data are unavailable, measurements for shorewater depth, bank overhang and overhanging woody vegetation indicate good streambank development.

Recommendation: Biological standards have been met. Initiate an acceptable grazing treatment in 1997. Monitor utilization during years the pasture is grazed. Re-evaluate biological standards in three years (1999).

Table 9
Comparison of habitat parameters between 1977, 1989, 1994 and 1996
for Little Jack Creek Canyon¹

Parameter	1977	1989	1994	1996	% Change from 1977/89
Riparian Condition Class (% optimum) ²	65	46	83	83	+28 to +82
Stream Width/Depth Ratio	22.1	29.6	na	24.0	+9 to -19
Riparian Zone Width (total ft)	na ³	na	6.0	9.8	+63 (from 1994)
Riparian Zone Width (ft) >75% Cover	na	na	4.7	9.1	+94 (from 1994)
Riparian Zone Width (ft) 50- 75% Cover	na	na	1.3	0.7	-46 (from 1994)
% Stream Width With Quality Pools	0	13.7	na	3.3	Undefined Increase to -76
Ave. Shorewater Depth (ft)	na	na	na ⁴	0.05	na
Ave. Bank Overhang (ft)	na	na	na ⁴	0.19	na
Ave. Woody Vegetation Overhang (ft)	na	na	na ⁴	0.11	na

¹ Based on station averages for LJ-9 through LJ-12 and BLM S-7 through S-10 where data are available.

² Optimum is considered totally stable streambanks with medium to heavy cover of tall shrubs or trees.

³ Not available.

⁴ Although information on these parameters was collected in 1994, it is not clear whether the data were estimated or measured and whether or not water was present in the channel at the time information was recorded.

NONSTREAM RIPARIAN MONITORING

Biological standards for hydrophytic cover were met for all pastures with the exception of Jack Pasture 1 and the Lower Simon Creek Parcel (Table 10). Although average hydrophytic cover did increase on Jack Pasture 1 by 6%, increases in plant cover occurred only for plots located in dry gravel beds. Hydrophytic cover decreased for the one study site located in more representative meadow habitat as a result of a cattle trail becoming established within the plot boundaries in 1996. The decrease in hydrophytic cover for the Lower Simon Parcel is the result of approximately two months of unplanned use occurring in June and July of 1996. Monitoring photos taken near the end of July in 1996 show significant areas of bare ground and fairly heavy utilization levels in the area represented by the study plots.

Although percent increases for hydrophytic cover were high for both the Coyote and Little Jack floodplains, it is important to recognize that these areas remain poorly vegetated gravel fields. Response potential continues to be limited by a lack of perennial streamflow.

Recommendation: For pastures where biological standards have been met, initiate an acceptable grazing treatment in 1997. Monitor utilization during years pastures are grazed. Re-evaluate biological standards in three years (1999).

Jack Pasture 1 could be grazed in 1997 depending on the results of a field inspection to evaluate habitat conditions and to determine if existing plot locations are representative. Lower Simon Parcel should be rested in 1997, but could be re-evaluated in July of 1998.

Table 10
Changes in Hydrophytic Cover Between 1994 and 1996 for Nonstream Riparian Habitats

Pasture	Stations	Hydrophytic Cover (%) (Average of All Stations)		% Change
		1994	1996	
Coyote Floodplain (Upper N. Native)	COY-3 to 5	0.5	1.3	+160
Cow Camp Pasture	COW-1, COY-1, and SPR-2	61.6	72.2	+17
Jack Pasture 2	LJ-1 and 2	81.1	92.0	+13
Jack Pasture 1	LJ-3 to 5	31.8	33.7	+6
Little Jack Floodplain (Upper N. Native)	LJ-6 to 8	8.0	20.3	+154
Lower Simon Creek Parcel	SIM-1 and 2	66.0	61.9	-6

AREAS EXCLUDED FROM GRAZING OR CONTROLLED BY MAGGIE CREEK RANCHSTREAM MONITORING

Middle Maggie Creek Parcel 2

This portion of Maggie Creek has shown excellent improvement over the past two years (Table 11) although dewatering has affected two of three monitoring stations (Congdon 1997). The riparian condition class is at nearly 70% of optimum (target value for restoration grazing zones on Maggie Creek), while there has been more than a 30% increase in that portion of the riparian zone supporting more than 75% woody and herbaceous plant cover. Although no comparative data exists for the width to depth ratio, a ratio of 27:1 indicates the stream is becoming narrow and deep (at least at MAG-6 where water is present throughout the summer). Increases in the remaining parameters also support an assessment of good stream conditions. No BLM stream survey stations were established for this pasture in 1980.

As with the Lower Maggie Creek Pasture, it is possible the absence of natural summer flow regimes may influence stream recovery processes and ability of the area to maintain current habitat conditions.

Recommendation: This area is defined as an exclusion zone; no grazing is permitted. Re-evaluate in five years (2001) as per SOAP Mitigation Plan requirements.

Table 11
Comparison of Habitat Parameters Between 1994 and 1996
for Middle Maggie Creek Parcel 2¹

Parameter	1994	1996	% Change
Riparian Condition Class (% optimum) ²	63	69	+10
Stream Width/Depth Ratio	na ³	27	na
Total Riparian Zone Width (ft)	17	20	+18
Riparian Zone Width (ft) >75% Cover	12.1	16.0	+32
Riparian Zone Width (ft) 50-75% Cover	4.9	3.9	+20
Ave. Shorewater Depth (ft)	0.15	0.15	0
Ave. Bank Overhang (ft)	0.05	0.09	+80
Ave. Woody Vegetation Overhang (ft)	0.10	0.30	+200

¹ Based on averages for MAG-4 through MAG-6 where data are available.

² Optimum is considered totally stable streambanks with medium to heavy cover of trees or tall shrubs.

³ Not available.

Maggie Creek Ranch Controlled (Above Narrows)

Different comparisons were made for station data depending on availability of information. Since MAG-8 had a corresponding BLM station (S-3), comparisons could be made between 1996, 1994, 1986 and 1980. Information which was collected in 1994 and 1996 but not in 1980 or 1986 is presented primarily for MAG-7 (much of the 1994 data for MAG-8 is missing).

Riparian habitat conditions are excellent for this portion of Maggie Creek and have improved substantially since the 1980s (Table 12). A rating of 76% of optimum for riparian condition class indicates streambanks are stable and well vegetated. Although the stream width to depth ratio appears to have increased, the 1996 data are biased upward by the presence of a blown-out beaver dam. No quality pools were encountered at transect locations on any of the surveys.

A comparison of data between 1994 and 1996 shows improvement in most parameters (Table 13). Riparian condition class is considered good to excellent, while shorewater depth, overhanging woody vegetation and bank overhang have all increased. Although the total width of the riparian zone appears to have remained static (the slight decrease is probably the result of observer differences), the portion of the riparian zone with cover in excess of 75% has increased by 14%. As described earlier, the decline in riparian zone width with cover between 50 and 75% should occur as plants colonize open spaces.

It should be noted that a major headcut progressing upstream through this reach may cause significant changes in habitat parameters in the future, particularly at MAG-8.

Recommendation: This section of stream is owned by Maggie Creek Ranch and does not have monitoring requirements in the SOAP Mitigation Plan. However, future monitoring of this reach in

cooperation with Maggie Creek Ranch is useful to the understanding of stream dynamics for the entire Maggie Creek system.

Table 12
Comparison of Habitat Parameters Between 1980, 1986, 1994 and 1996 for the Portion of Maggie Creek Controlled by Maggie Creek Ranch Above the Narrows¹

Parameter	1980	1986	1994	1996	% Change from 1980/86
Riparian Condition Class (% optimum) ²	45.5	30.5	76	76	+67 to +149
Stream Width/Depth Ratio	35.9	43.2	na ³	60.8 ⁴	+69 to +41
% Stream Width With Quality Pools	0	0	0	0	0

¹ Based on data for MAG-8 and BLM S-3.

² Optimum is considered to totally stable streambanks with medium to heavy cover of tall shrubs or trees.

³ Not available.

⁴ Blown out beaver dam.

Table 13
Comparison of Habitat Parameters Between 1994 and 1996 for the Portion of Maggie Creek Controlled by Maggie Creek Ranch above the Narrows¹

Parameter	1994	1996	% Change
Riparian Condition Class (% optimum) ²	68.5	70.5	+3
Total Riparian Zone Width (ft)	21.0	20.3	-3
Riparian Zone Width (ft) >75% Cover	16.6	18.9	+14
Riparian Zone Width (ft) 50-75% Cover	4.4	1.4	-68%
Ave. Shorewater Depth (ft)	0.12	0.14	+17
Ave. Bank Overhang (ft)	0.04	0.08	+100
Ave. Woody Vegetation Overhang (ft)	0.0	0.10	Undefined Increase

¹ Based on data from MAG-7 for all parameters except Riparian Condition Class. Riparian condition class is based on the average of MAG-7 and MAG-8.

² Optimum is considered totally stable streambanks with medium to heavy cover of tall shrubs or trees.

Middle Maggie Creek Parcel 1 - Water Gap

Habitat conditions have improved slightly in the portion of Maggie Creek serving as a water gap for Maggie Creek Ranch cattle (Table 14). However, the low values for riparian condition class and riparian zone width, as well as the increase in the width to depth ratio and lack of quality pools all indicate overall conditions remain poor. However, improvement was apparent for shorewater depth.

Recommendation: Re-evaluate conditions in five years in conjunction with Middle Maggie Creek Parcel 1 (2001) as per SOAP Mitigation Plan requirements.

Table 14
Comparison of Habitat Parameters Between 1980, 1986, 1994 and 1996 for the Portion of Maggie Creek Included Within Middle Maggie Creek Parcel 1 Water Gap¹

Parameter	1980	1986	1994	1996	% Change from 1980/86
Riparian Condition Class (% optimum) ²	25	na ³	25	36	+44
Stream Width/Depth Ratio	30.9	na	na	54	+75
% Stream Width With Quality Pools	50	na	na	0	Undefined Decrease
Riparian Zone Width (total ft)	na	na	0	5.0	Undefined Increase
Riparian Zone Width (ft) >75% Cover	na	na	0	1.6	Undefined Increase (from 1994)
Riparian Zone Width (ft) 50-75% Cover	na	na	0	3.4	Undefined Increase (from 1994)
% Stream Width With Quality Pools	50	na	na	0	Undefined Decrease
Ave. Shorewater Depth (ft)	na	na	0	0.27	Undefined Increase (from 1994)
Ave. Bank Overhang (ft)	na	na	0.4	0.0	Undefined Decrease (from 1994)
Ave. Woody Vegetation Overhang	na	na	0.0	0.0	0

¹ Based on station averages for MAG-11 and BLM S-6 where data are available.

² Optimum is considered totally stable streambanks with medium to heavy cover of tall shrubs or trees.

³ Not available.

Middle Maggie Creek Parcel 1

As with other portions of Maggie Creek, improvement has been excellent (Table 15). With the exception of woody vegetation overhang, substantial improvement occurred for all variables over levels existing in 1980/86 and 1994. The decline in the portion of the riparian zone with 50-75% cover and increase in the portion with >75 % cover represents filling in of open spaces. Currently, this reach of Maggie Creek is characterized by stable, well developed streambanks, quality pool habitat, a healthy riparian zone and a narrow, deep channel profile.

Recommendation: This area is defined as an exclusion zone; no grazing is permitted. Re-evaluate in five years (2001) as per SOAP Mitigation Plan requirements.

Table 15
Comparison of Habitat Parameters Between 1980, 1986, 1994 and 1996 for the Portion of Maggie Creek Included Within Middle Maggie Creek Parcel 1¹

Parameter	1980	1986	1994	1996	% Change from 1980/86
Riparian Condition Class (% optimum) ²	30.4	25	55.1	64.3	+112 to +157
Stream Width/Depth Ratio	33.8	48.5	na	26.6	-21 to -45
Riparian Zone Width (total ft)	na	na	30.7	41.8	+36 (from 1994)
Riparian Zone Width (ft) >75% Cover	na ³	na	26.6	37.9	+43 (from 1994)
Riparian Zone Width (ft) 50-75% Cover	na	na	4.1	3.9	-5 (from 1994)
% Stream Width With Quality Pools	10.2	0	na	25.4	+149 to Undefined Increase
Ave. Shorewater Depth (ft)	na	na	0.06	0.14	+133 (from 1994)
Ave. Bank Overhang (ft)	na	na	0.03	0.09	+200 (from 1994)
Ave. Woody Vegetation Overhang (ft)	na	na	0.01	0.01	0 (from 1994)

¹ Based on station averages for MAG-13 through MAG-19 and BLM S-7 through BLM S-13 where data are available.

² Optimum is considered totally stable streambanks with medium to heavy cover of tall shrubs or trees.

³ Not available.

Maggie Creek Ranch Controlled-Upper Reach

Much of this reach is characterized by a dense, well developed riparian zone with deep pools, although vertical eroding banks persist in areas when channel downcutting has occurred in the past. Monitoring data show changes have occurred over time, but generally conditions remain good (Table 16). The riparian condition class is excellent and has improved over earlier surveys, although changes in the width to depth ratio are variable. The recorded decline in width of the riparian zone for all three categories (total, 75% cover and 50-75% cover) is based on limited data (only data from stations MAG 24 and 25 were evaluated). The high percentage of quality pools, depth at the shorewater interface, presence of undercut streambanks and overhanging woody vegetation are all indicative of good stream habitat conditions.

Recommendation: This section of stream is owned by Maggie Creek Ranch and does not have monitoring requirements in the SOAP Mitigation Plan. However, future monitoring of this reach in cooperation with Maggie Creek Ranch is useful to the understanding of stream dynamics for the entire Maggie Creek system.

Table 16
Comparison of Habitat Parameters Between 1980, 1986, 1994 and 1996 for the Portion of Maggie Creek Controlled by the Maggie Creek Ranch¹

Parameter	1980	1986	1994	1996	% Change from 1980/86
Riparian Condition Class (% optimum) ²	60	42	58	79	+32 to +81
Stream Width/Depth Ratio	13.4	24.7	na ³	18.7	+40 to -24
Riparian Zone Width (total ft)	na	na	53 ⁴	23 ⁴	-57 (from 1994)
Riparian Zone Width (ft) >75% Cover	na	na	53 ⁴	22 ⁴	-58 (from 1994)
Riparian Zone Width (ft) 50-75% Cover	na	na	0 ⁴	1 ⁴	Undefined Decrease (from 1994)
% Stream Width With Quality Pools	62	3	na	96	+55 to +3,100
Ave. Shorewater Depth (ft)	na	na	Dry	0.27	na
Ave. Bank Overhang (ft)	na	na	Dry	0.11	na
Ave. Woody Vegetation Overhang (ft)	na	na	Dry	2.71	na

¹ Based on station averages for MAG-24 through MAG-28 and BLM S-18 through S-22 where data are available.

² Optimum is considered totally stable streambanks with medium to heavy cover of tall shrubs or trees.

³ Not available.

⁴ Based on data from MAG-24 and MAG-25 only since no information was collected at MAG-26, 27 or 28 in 1994.

OTHER MONITORING

Functioning Condition Assessments

Where information was available, all stream and riparian areas within the MCWRP area were rated as being in proper functioning condition (PFC) or functional at risk upward trend by 1996 (Table 17). PFC means riparian-wetland areas are able to dissipate energy associated with high flows; filter sediment; capture and store runoff; support diverse habitat characteristics; and, have healthy well developed riparian zones. Functioning "at risk" means the system is functioning, but an existing soil, water, or vegetation attribute makes them susceptible to degradation.

Where stream segments or wetland areas were rated as being functional at risk-upward trend in 1996, usually only one of many attributes was considered not to be representative of properly functioning conditions. In essence, all areas evaluated were very close to being rated as PFC. Consequently, evaluated areas should be resistant to degradation with proper grazing management.

Recommendation: The Mitigation Plan requires that functioning condition assessments be completed in 1994, again before livestock are reintroduced to areas scheduled for grazing, and at five years after that time. As indicated in Table 17, not all the required assessments have been completed. Depending on whether grazing is permitted in 1997, lentic (standing water) assessments need to be completed for Cow Camp Pasture, Jacks Pasture 1 and 2, and Lower Simon Creek Parcel prior to turn-out of cattle. Although assessments were completed for Coyote Canyon (Upper Northern Native) and Coyote Pasture (Maggie Creek) as scheduled, the assessments were for lentic rather than lotic habitats. The lotic analysis is more appropriate for flowing water habitats, whereas the lentic

assessment is more applicable to areas supporting standing water. Any future functioning condition assessments of these two areas should be based on the lotic checklist.

Table 17
Results of Functioning Condition Assessments for 1994 and 1995

Parcel	Mitigation Plan Checklist Requirement	Functioning Condition Assessment (Lotic)		Functioning Condition Assessment (Lentic)	
		1994	1996	1994	1996
Maggie Creek					
Lower Maggie Creek (H-7)	LOTIC	Nonfunctional	Functional at Risk-Upward Trend	NA ¹	NA
Middle Maggie Creek Parcel 2/ Lower Maggie Creek Ranch Controlled	None	Functional at Risk-Upward Trend	Functional at Risk-Upward Trend	NA	NA
Simons Pastures 1-3 (Maggie Creek)	LOTIC	Functional at Risk-Upward Trend	Functional at Risk-Upward Trend	NA	NA
Middle Maggie Creek Parcel 1	None	Functional at Risk-Upward Trend	Functional at Risk-Upward Trend	NA	NA
Coyote Pasture (Maggie Creek)	LOTIC	Functional at Risk-Upward Trend	Not Completed	NA	Functional at Risk-Upward Trend ²
Upper Maggie Creek Ranch Controlled	None	Functional at Risk-Upward Trend	NA	NA	NA
Coyote Creek					
Cow Camp Pasture	LOTIC; Revised to LENTIC (5-30-96) ³	Not Completed	NA	NA	Not Completed
Jack/Coyote Floodplain (Upper N. Native)	LOTIC; Revised to None (5-30-96)	Not Completed	NA.	NA	NA
Coyote Canyon (Upper N. Native)	LOTIC	Proper Functioning Condition (PFC) - Upward Trend	Not Completed	NA	Proper Functioning Condition (PFC) -Upward Trend ²
Little Jack Creek					
Jacks Pastures 1 and 2	LOTIC; Revised to LENTIC (5-30-96)	Not Completed	NA	NA	Not Completed
Jacks/Coyote Floodplain (Upper N. Native)	LOTIC; Revised to None (5-30-96)	Not Completed	NA	NA	NA

Table 17
Results of Functioning Condition Assessments for 1994 and 1995

Parcel	Mitigation Plan Checklist Requirement	Functioning Condition Assessment (Lotic)		Functioning Condition Assessment (Lentic)	
		1994	1996	1994	1996
Little Jack Creek Canyon (Upper N. Native)	LOTIC	Proper Functioning Condition (PFC)	Proper Functioning Condition (PFC)/ Functional at Risk- Upward Trend	NA	NA
Simon Creek					
Lower Simon Creek Parcel	LOTIC; Revised to LENTIC (5-30-96)	Not Completed	NA	NA	Not Completed

¹ Not applicable.

² Based on Lentic Functioning Condition Assessment which is more suited to standing water riparian habitats including seeps, springs and meadows.

³ Based on recommendations presented in a letter from BLM to Martin Jones dated 5-30-96.

Pebble Count

Pebble count data were collected for the first time in 1996 for all monitored stream reaches. Although no comparative data are available, the 1996 data will provide a baseline for future monitoring.

CONCLUSIONS

Stream and riparian habitats within the MCWRP area have improved significantly since implementation of the Mitigation Plan in 1993. Currently most aquatic-wetland habitats within the restoration area support healthy well developed riparian zones. Where biological standards have been met, implementation of acceptable grazing treatments should not result in degradation of stream or riparian habitat conditions. Acceptable grazing treatments are those which will result in maintenance of biological standards. Examples include cool season (especially spring) grazing, short duration grazing, providing for regrowth at least 75% of the time over the course of a four year grazing cycle, application of utilization restrictions and use of tools such as prescribed burning, riding, and supplemental feeding to reduce use of riparian areas. Other treatments may be appropriate based on local experience or applicable literature.

The stream and riparian habitat monitoring program established for the MCWRP is working well, although there is a need to revise some of the biological standards as previously discussed by Newmont and BLM. The width to depth ratio requirement for Coyote and Little Jack Creeks of 15:1 or a 30% decline over baseline conditions should be dropped in favor of maintaining a stream width to depth ratio in the low to mid twenties. Evaluation of riparian zone width data should be based on stratification by cover. As previously discussed, an improving riparian zone should become increasingly dense although outward expansion may be limited by hydrology.

REFERENCES CITED

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***Riparian Monitoring Analysis - 1998 Field Season
Newmont Gold Company's South Operations Area Project Mitigation Plan
Maggie Creek Watershed Restoration Project***

***Prepared by Elko Field Office, Bureau of Land Management
3-9-99***

Introduction

Monitoring was completed by the Bureau of Land Management (BLM) in 1998 on selected stream and riparian habitats within the Maggie Creek Watershed Restoration Project (MCWRP) area under provisions of the South Operations Area Project (SOAP) Mitigation Plan (BLM 1993). The SOAP Mitigation Plan was developed as part of the SOAP Environmental Impact Statement (EIS) completed in 1993.

Purpose

The purpose of this report is to evaluate condition of stream and riparian habitats in relation to biological standards established in the Mitigation Plan and to evaluate the impacts of livestock grazing treatments applied to selected pastures in 1998.

Procedures

Wetland (hydrophytic) cover in the Lower Simon Creek Parcel and stream habitat conditions on Maggie Creek were monitored using methods specified in the Mitigation Plan. Stream habitat conditions on Indian Jack and Lynn Creeks were monitored using BLM's stream survey methodology (BLM Manuals 6671 and 6720-1). Livestock utilization was estimated for herbaceous and woody plants based on comparisons to caged (ungrazed) plants in most cases.

Pastures selected for monitoring in 1998 were based on provisions of the Mitigation Plan and on recommendations developed in the Riparian Monitoring Analysis prepared by BLM in 1997 (BLM 1997). Monitoring in 1998 was focused on pastures where biological standards had not been attained by 1996 and where grazing was applied on a prescriptive basis in 1998 (Table 1). Note that not all pastures grazed in 1998 had biological standards. For specific monitoring requirements and biological standards, refer to the SOAP Mitigation Plan. Pasture names and locations are shown in Figure 1.

Table 1
Pastures Within the MCWRP Area Monitored by BLM in 1998

Pastures Grazed in 1998	Pastures Evaluated for Attainment of Biological Standards
H-1 - Maggie Creek	H-7 - Maggie Creek
H-7 - Maggie Creek	Coyote - Maggie Creek
Simons 1-3 - Maggie Creek	Lower Simon Creek Parcel
Jacks 1-2	Jack 1 (upper)
Cow Camp 2	
Lower North Native - Indian Jack and Lynn Creeks*	

* While included within the MCWRP area, these streams were also monitor in 1998 as part of BLM's normal allotment monitoring program.

Results

Results are summarized for each pasture or area evaluated. Refer to Appendix I for a description of monitored parameters.

Maggie Creek (H-7 Pasture)

Although biological standards for riparian condition class and stream width to depth ratio have not been met for the portion of Maggie Creek within the H-7 Pasture, riparian habitat conditions are clearly improving (Table 2, Figures 2-4). Virtually all habitat parameters measured showed excellent improvement over earlier surveys. The only exception is width of the riparian zone with greater than 75% cover. Values recorded for 1998 were lower than for 1994 or 1996. Review of the data suggest observer error may have resulted in an underestimation of this parameter.

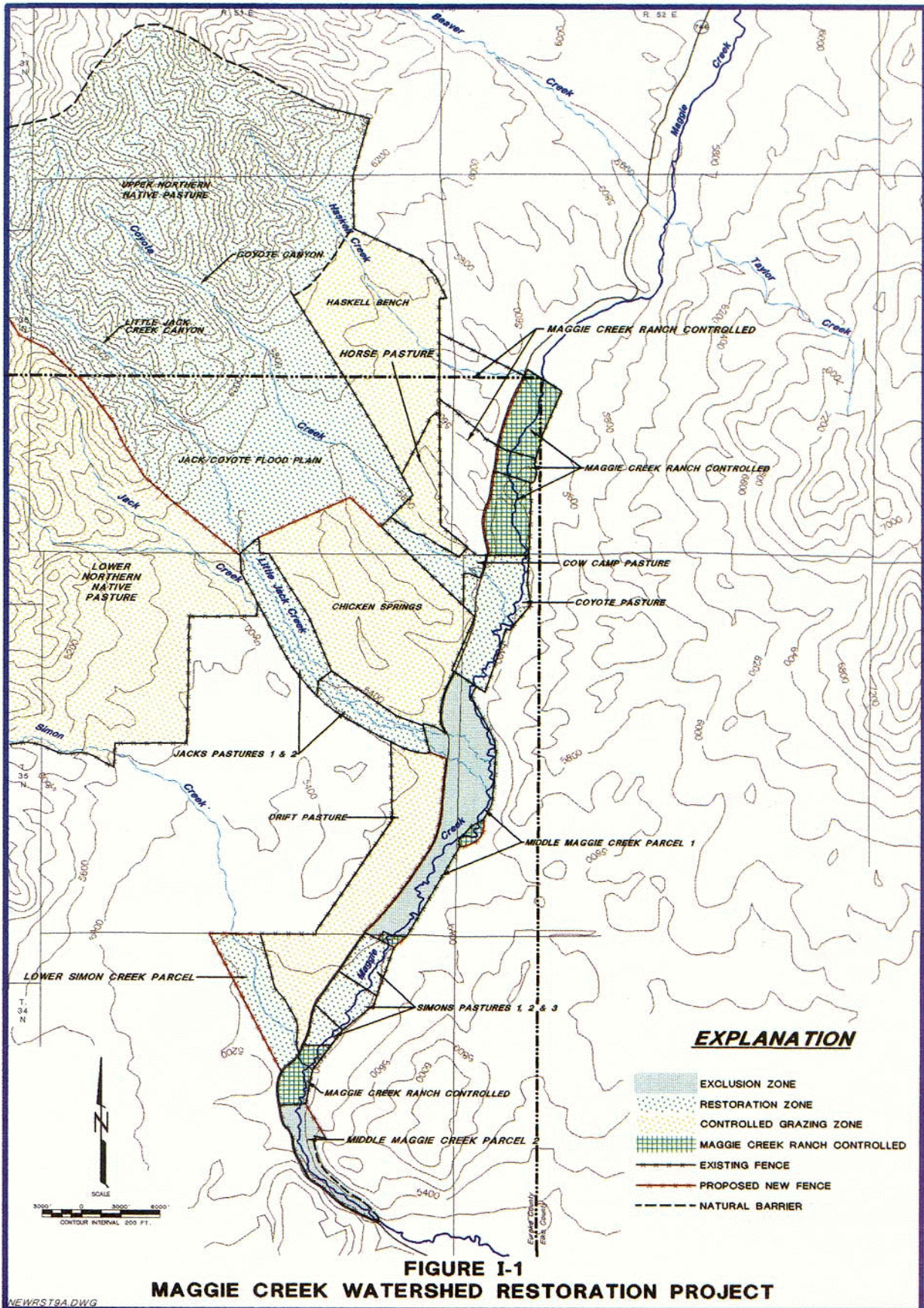


Table 2
Changes in Stream and Riparian Habitat Conditions on Maggie Creek in the H-7 Pasture Between 1994 and 1998¹

Stream Habitat Parameter	Year of Survey			Biological Standard ²
	1994 (Baseline)	1996	1998	
<i>Mitigation Plan Evaluation Criteria</i>				
Riparian Condition Class (% optimum) ³	45	50	58	70 (not met)
Stream Width/Depth Ratio	no data	27*	21	30% (not met)
Total Riparian Zone Width (ft)	9.8	12.4	14.3	30% (met)
Riparian Zone Width (ft) >75% Cover	5.5	6.9	5.3	N/A
Riparian Zone Width (ft) 50-75% Cover	4.3	5.5	9.0	N/A
<i>Mitigation Plan Informational Monitoring⁴</i>				
Ave. Shorewater Depth (ft)	Mostly dry	<0.1	0.2	N/A
Ave. Bank Overhang (bank undercut) (ft)	Mostly dry	0.0	<0.1	N/A
Ave. Woody Vegetation Overhang	Mostly dry	0.0	0.1	N/A

¹ Although pool quality was identified in the Mitigation Plan as being an "informational" monitoring parameter, data are not presented for this portion of Maggie Creek due to problems with data collection.

² Refer to SOAP Mitigation Plan (BLM 1993).

³ Average of bank cover and bank stability. Optimum is considered totally stable streambanks with medium to heavy cover of trees or tall shrubs.

* Value is different than shown for Riparian Monitoring Analysis (BLM 1997) due to recalculation.

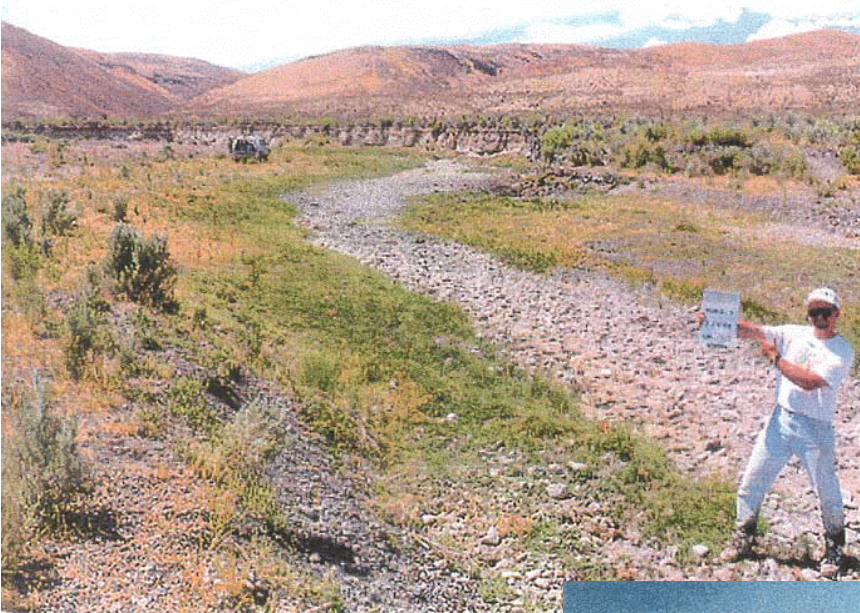


Figure 2. Maggie Creek MAG-3, T-1, Up, 7/27/94. H-7 Pasture. Habitat conditions are extremely poor. Although portions of the stream became dry in 1994, grazing practices in prior years have prevented establishment of willows and other riparian plant species.

Figure 3. Maggie Creek, MAG-3, T-1, Up, 7/19/96. H-7 Pasture. Early stages of floodplain recovery are evident. Increased growth or riparian vegetation has allowed for the trapping of sediment and formation of point bars which eventually become part of a new floodplain.

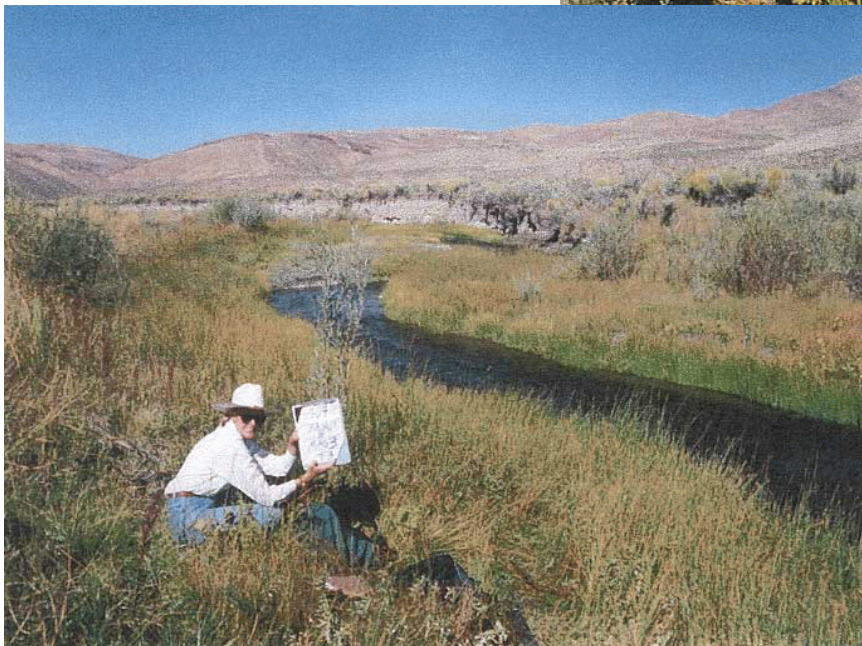
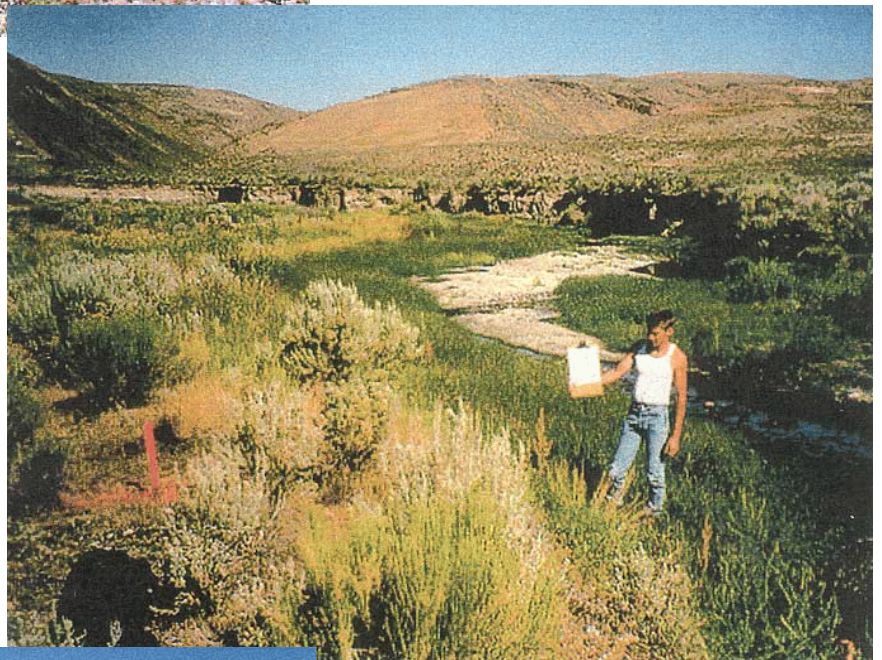


Figure4. Maggie Creek, MAG-3, T-1, Up 9/24/98. H-7 Pasture. Point bars have become completely colonized with vegetation and are now stable. The channel has become narrow and deep allowing for the formation of pools and undercut banks. Note growth of new willows on previously dry floodplains.

Maggie Creek (Coyote Pasture)

Although biological standards have not been met for riparian condition class and riparian zone width, this portion of Maggie Creek is clearly improving (Table 3, Figures 5-7). Riparian condition class, though not yet met, is steadily approaching optimum conditions. Dense populations of willows have established to protect and stabilize banks, while pools are becoming larger and deeper.

The apparent lack of improvement in riparian zone widths and in other variables associated with bank development is related to a high level of sediment deposition occurring within the Coyote Pasture (Figures 8-10). Sediment from eroding banks in upstream pastures is being effectively trapped in the Coyote Pasture as a result of improved habitat conditions and slowed water velocities. Newly established point bars are typically "laid back" (in contrast to undercut); are only marginally colonized by riparian vegetation; and, support virtually no depth at the shorewater interface.

Table 3
Changes in Stream and Riparian Habitat Conditions to Maggie Creek
In the Coyote Pasture from 1980 to 1998¹

Stream Habitat Parameter	Year of Survey					Biological Standard ²
	1980 (baseline)	1986 (baseline)	1994 (baseline)	1996	1998	
<i>Mitigation Plan Evaluation Criteria</i>						
Riparian Condition Class (% optimum) ³	47	34	58	63	65	70 (not met)
Stream Width/Depth Ratio	20	32	na	21 ^{3*}	19	30% from 1986 (met)
Total Riparian Zone Width (ft)	na ⁴	na	35	33	27	30% (not met)
Riparian Zone Width (ft) >75% Cover	na	na	34	26	22	N/A
Riparian Zone Width (ft) 50-75% cover	na	na	1.6	6.7	5	N/A
<i>Mitigation Plan Informational Monitoring</i>						
% Stream Width with Quality Pools	74.5	4.9	na	18*	33	N/A
Ave. Shorewater Depth (ft)	na	na	0.3	0.2*	0.2	N/A
Ave. Bank Overhang (bank undercut) (ft)	na	na	0	<0.1*	<0.1	N/A
Ave. Woody Vegetation Overhang (ft)	na	na	na	0.3*	0.2	N/A

¹ Based on station averages or MAG-20, M-21 and MAG-23 and BLM S-14 where data are available.

² Refer to SOAP Mitigation Plan (BLM 1993)

³ Average of bank cover and bank stability. Optimum is considered totally stable streambanks with medium to heavy cover of trees or tall shrubs.

* Value is different than shown for 1997 Monitoring Report (BLM 1997) due to recalculation of data.



Figure 5. Maggie Creek MAG-20, T-1, Up, 7/19/94. Coyote Pasture. Although excellent growth of willows has occurred since this area was first rested in 1992, the channel remains wide and shallow. Even during bankful conditions, the stream cannot access the floodplain forming the left bank.

Figure 6. Maggie Creek, MAG-20, T-1, Up 8/1/96. Coyote Pasture. Growth of riparian vegetation is increasing. Although the bankful stream channel remains wide and shallow, vegetation colonizing lower velocity areas is beginning to trap sediments. This is the process by which a new, more accessible floodplain forms.



Figure 7. Maggie Creek, MAG-20, T-1, Up, 9/23/98. Coyote Pasture. A new floodplain accessible to the stream is beginning to form on the left. The result is a place for vegetation to become established which in turn will lead to formation of a narrower, deeper stream channel.

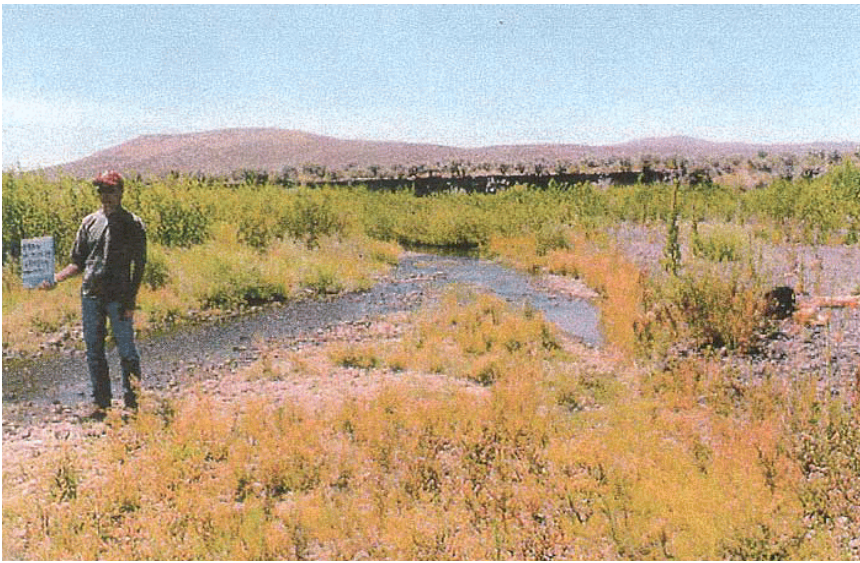


Figure 8. Maggie Creek, MAG-20, T-1, Down, 7/19/94. Coyote Pasture. Early Signs of recovery in the form of vigorous willow growth are evident after two years of rest.

Figure 9. Maggie Creek, MAG-20, T-1, Down, 8/1/96. Coyote Pasture. Continued recovery is resulting in stable, well vegetated streambanks and an increasingly deep, narrow stream channel.

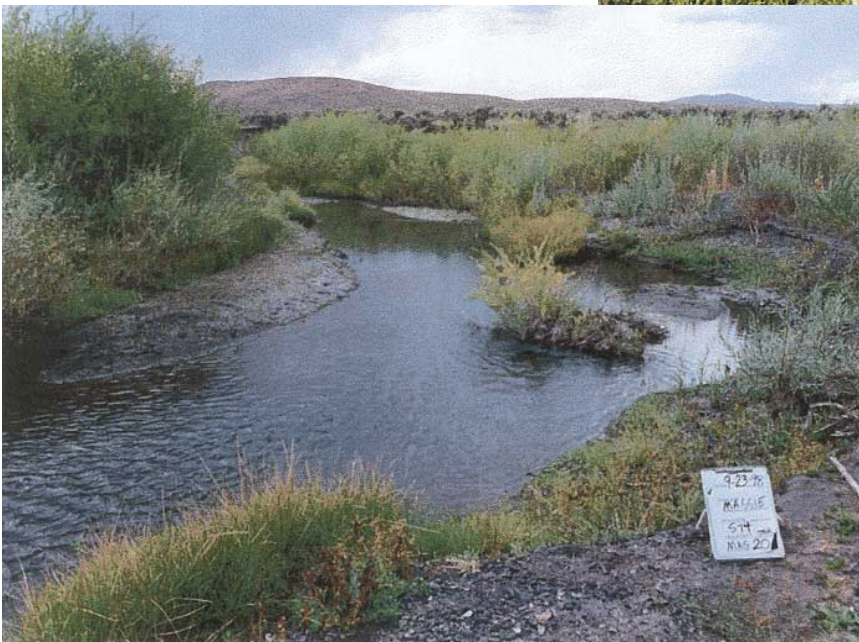


Figure 10. Maggie Creek, MAG-20, T-1, Down, 9/23/98. Coyote Pasture. The recovery process is being influenced by excessive sediment deposition. The expanding riparian zone in the Coyote Pasture is becoming increasingly effective at trapping sediment generated from private lands upstream. In 1998, numerous point bars (shown to the left of the watered channel) as well as mid channel bars were observed within the Coyote Pasture. Although sediment deposition is a necessary component of floodplain building, the result here is a decrease in the width of the measured riparian zone and in factors associated with bank development such as shorewater depth and woody vegetation overhang.

Indian Jack Creek (Jack Pasture 1)

Stream and riparian habitat conditions have improved substantially on the portion of Indian Jack Creek within the Jack Pasture 1 since 1992 (Table 4, Figures 11 and 12). With the exception of bank cover, all parameters evaluated showed improvement. The difference between 1992 and 1998 ratings for bank cover ratings is probably not significant; rather the similarity in ratings reflects continued maintenance of a sedge dominated riparian zone.

A new population of Lahontan cutthroat trout were found at and just below the monitoring site (BLM survey station S-1). Although this section of stream is supported by springs, Indian Jack Creek becomes intermittent a short distance upstream. While habitat conditions are substantially better in the stream segment inhabited by cutthroat trout now than in 1992, some localized problems in the form of heavy use of willows and trampling of streambanks were noted at and below the monitoring station.

Table 4
Changes in Stream and Riparian Habitat Conditions in Jack Pasture 1 on Indian Jack Creek Between 1992 and 1998¹

Stream Habitat Parameter	Year of Survey	
	1992	1998
<i>Limiting Factors for Fisheries</i>		
Pool-Riffle Ratio (% optimum) ²	4	92
% Pools Rated as Quality Pools ³	0	31
% Desirable Streambottom Substrates ⁴	28	56
Bank Cover (% optimum)	45	43
Bank Stability (% optimum)	45	60
Riparian Condition Class (% optimum) ⁵	45	52
<i>Other Indicators of Stream Condition</i>		
Stream Width/Depth Ratio	15	9
Ave. Shorewater Depth (ft)	<0.1	0.2
Ave. Bank Angle (°)	144	135
Ave. Bank Overhang (bank undercut) (ft)	0.0	<0.1
Ave. Substrate Embeddedness ⁵	1.0	3.8

¹ Based on data from BLM stream survey station S-1.

² Assumes a ratio of 50% pools and 50% riffles is optimum.

³ Quality pools have depth, are wide or long, and have at least some cover.

⁴ Desirable substrates include gravel and rubble.

⁵ Average of bank cover and bank stability. Optimum represents totally stable streambanks vegetated with trees or tall shrubs.

⁶ Percent of rubble, gravel, or boulder surface covered by fine sediments; 5=<5%; 4=5-25%; 3=25-50%; 2=50-75%; 1=>75%.



Figure 11. Indian Jack Creek, Jack 1 Pasture, S-1, T-1, Down 9/15/92. *Habitat conditions are poor. An exposed, shallow channel has allowed for extensive growth of algae. The streambottom is comprised almost exclusively of fine sediments. Riffles and quality pools are virtually nonexistent, while there is essentially no depth at the shorewater interface.*



Figure 12. Indian Jack Creek, Jack Pasture 1, S-1, T-1, Down 8/11/98. *Habitat conditions have shown excellent improvement since 1992. The stream is much narrower and deeper resulting in increased bank storage, cooler summer stream temperatures, and formation of undercut banks and quality pools. Both substrate composition and embeddedness of substrates have also improved. Note sagebrush on the left bank which was alive in 1992 has died in response to an elevated water table. Lahontan cutthroat trout were documented for the first time at this location in 1998.*

Indian Jack Creek (Lower North Native)

With few exceptions, most measured parameters showed excellent improvement over earlier surveys (Table 5). Improvement was especially good in relation to the very poor habitat conditions recorded for 1992 (Figures 13-16). Although significant portions of Indian Jack Creek are intermittent, areas supporting at least some surface or near surface flow have responded well to current grazing practices.

Table 5
Changes in Stream and Riparian Habitat Conditions on Little Jack Creek in the Lower North Native Pasture Between 1977 and 1998¹

Stream Habitat Parameter	Year of Survey		
	1977	1992	1998
<i>Limiting Factors for Fisheries</i>			
Pool-Riffle Ratio (% optimum) ²	52	68	52
Pools Rated as Quality Pools ³	0	0	21
% Desirable Streambottom Substrates ⁴	33	13	91
Bank Cover (% optimum)	33	27	40
Bank Stability (% optimum)	56	31	65
Riparian Condition Class (% optimum) ⁵	45	29	53
<i>Other Indicators of Stream Condition</i>			
Stream Width/Depth Ratio	21	24	18
Ave. Shorewater Depth (ft)	no data	<0.1	<0.1
Ave. Bank Angle (°)	no data	146	141
Ave. Bank Overhang (bank undercut) (ft)	no data	<0.1	0.0
Ave. Substrate Embeddedness	no data	1.3	4.2

¹ Based on data from LM stream survey stations 9-3, S-5, and S-6. Stations S-2 and S-4 are intermittent and were not considered in the analysis.

² Assumes a ratio of 50% pools and 50% riffles is optimum.

³ Quality pools have depth, are wide or long, and have at least some cover.

⁴ Desirable substrates include gravel and rubble.

⁵ Average of bank cover and bank stability. Optimum represents totally stable streambanks vegetated with trees or tall shrubs.

⁶ Percent of rubble, gravel, or boulder surface covered by fine sediments; 5=<5%; 4=5-25%; 3=25-50%; 2=50-75%; 1=>75%.



Figure 13. *Indian Jack Creek, Lower North Native, S-3, T-1, Up, 9/14/92. Habitat conditions are extremely poor. There is virtually no riparian zone development, while the stream channel is completely exposed. Substrates are covered with algae and fine sediments. The floodplain is becoming increasingly dry as evidenced by the invasion of young sagebrush.*



Figure 14. *Indian Jack Creek, Lower North Native, S-3, T-1, Up, 8/17/98. Improvement has been dramatic since 1992. The floodplain has become much more hydrated (note the replacement of sagebrush with willow), while substrates are becoming cleaner and less embedded. Note the increase in sinuosity and the development of a “buffer zone” between the stream channel and the old cut banks.*



Figure 15. Indian Jack Creek, Lower North Native, S-6, T-1, Down, 9/16/92. As with downstream areas, habitat conditions were extremely poor in 1992. The channel is completely exposed, while there is almost no riparian zone.



Figure 16. Indian Jack Creek. Lower North Native, S-6, T-1, Down, 8/17/98. Improvement in the riparian zone has led to significant improvement of instream fisheries habitat. Vegetation is beginning to overhang the water column providing for shading and an increase in the shorwater depth. The channel is narrower and deeper, while streambottom substrates are much cleaner and are less embedded by fine sediments. Note the establishment of willow on a site previously occupied by sagebrush.

Although much of Lynn Creek is vertically unstable, data collected in 1998 show both stream and riparian habitat conditions are improving (Table 6, Figures 17 and 18).

Table 6
Changes in Stream and Riparian Habitat Conditions on Lynn Creek in the Lower North Native Pasture Between 1977 and 1998¹

Stream Habitat Parameter	Year of Survey		
	1977	1991	1998
<i>Limiting Factors for Fisheries</i>			
Pool-Riffle Ratio (% optimum) ²	76	68	88
% Pools Rated as Quality Pools ³	0	0	0
% Desirable Streambottom Substrates ⁴	13	25	80
Bank Cover (% optimum)	25	35	44
Bank Stability (% optimum)	66	49	66
Riparian Condition Class (% optimum) ⁵	46	42	55
<i>Other Indicators of Stream Condition</i>			
Stream Width/Depth Ratio	13	21	14
Ave. Shorewater Depth (ft)	no data	<0.1	<0.1
Ave. Bank Angle ()	no data	152	135
Ave. Bank Overhang (bank undercut) (ft)	no data	<0.1	<0.1
Ave. Substrate Embeddedness ⁶	no data	2.3	3.5

¹ Based on data from BL M stream survey stations S-1 and S-2.

² Assumes a ratio of 50% pools and 50% riffles is optimum.

³ Quality pools have depth, are wide or long, and have at least some cover.

⁴ Desirable substrates include gravel and rubble.

⁵ Average of bank cover and bank stability. Optimum represents totally stable streambanks vegetated with trees or tall shrubs.

⁶ Percent of rubble, gravel, or boulder surface covered by fine sediments; 5=<5%; 4=5-25%; 3=25-50%; 2=50-75%; 1=>75%.

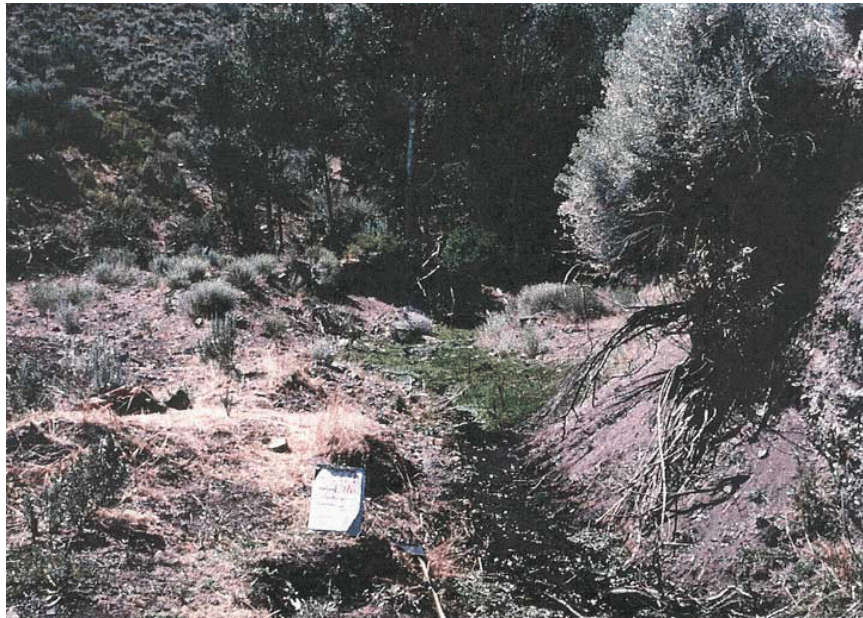


Figure 17. *Lynn Creek, Lower North Native, S-2, T-1, Up, 8/12/91. Habitat conditions are very poor as shown by almost complete absence of riparian zone. The stream channel is shallow and exposed, while there is no recent evidence of regeneration by willow or aspen. In addition, significant portions the Lynn Creek drainage are entrenched as a result of past mining and road building activities including poor placement of culverts.*



Figure 18. *Lynn Creek, Lower North Native, S-2, T-1, Up, 8/17/98. Excellent growth and establishment of willow and aspen have occurred since 1991. Although the stream channel remains entrenched, improvement in the riparian zone is allowing for a reduction in bank erosion rates and improved composition of streambottom substrates.*

Wetland (Hydrophytic) Plant Cover

Only one of three wetland (hydrophytic) plant cover monitoring sites was analyzed for changes in plant species composition in 1998 (Table 7). The remaining sites (LJ-3 - LJ-5 and SIM1) were felt to lack response potential or occurred within an enclosure. On SIM2 within the Lower Simon Creek Parcel, hydrophytic cover criteria have been met. Hydrophytic cover increased by 38%, while most of the plant species present (90%) on the site are considered indicative of wetland conditions.

Table 7
Summary of Hydrophytic Cover Monitoring Completed in 1998

Pasture	Stations	Average Hydrophytic Cover (%) ¹		% Change	Comments
		1996	1998		
Jack Pasture 1	LJ-3 to LJ-5	32	no data	N/A	Dry gravel bed; no response potential
Lower Simon Creek Parcel	SIM1	59	no data	N/A	Fenced and excluded from grazing
Lower Simon Creek Parcel	SIM2	65	90	+38	Criteria for 10% met

¹ Hydrophytic plants are defined as facultative (FAC) or wetter (Mitigation Plan, BLM 1993).

Utilization Monitoring

With few exceptions, utilization of riparian and other vegetation was slight to light for pastures grazed by livestock in 1998 (Table 8). In most cases, there was little observable difference between grazed and ungrazed plants by the end of the growing season particularly for herbaceous vegetation (Figures 19-23). In some pastures, use of willows was recorded as moderate.

Table 8
Summary of Utilization Monitoring for Pastures Grazed by Livestock in 1998

Monitoring Site	Livestock Grazing		Date of Inspection	Riparian Plant Utilization (% of Current Year's Growth)	
	Dates	AUMs ^d		Herbaceous	Woody
Maggie Creek Pastures					
H-1 Cage	10/15-11/2	219	10-28-98	Slight	Moderate
H-7 Cage	2/23-3/25 -4/1-4/15	357 15	3-13-98 4-9-98	Zero to slight Slight	Zero to slight Slight
SIM1 ³ -Streamside Cage	2/28 - 4/3	353	3-13-98 4-9-98 10-21-98	Slight Slight No detectable Use	Slight Slight No detectable use
SIM1-Uplands			3-13-98 4-9-98 10-21-98	Slight (light-moderate old feed) Light (moderate old feet) Zero to slight	N/A N/A N/A
SIM2-Streamside Cage			3-13-98 4-9-98 10-21-98	No detectable use Slight No detectable use	No detectable use Slight No detectable use
SIM2-Uplands			3-13-98 4-9-98 10-21-98	Slight (slight old feed) Light Zero to slight	N/A N/A N/A
SIM3 - Streamside Cage 1			3-24-98 4-9-98 10-21-98	No detectable use Slight No detectable use	No detectable use Slight No detectable use
SIM3 - Streamside Cage 2			4-9-98 10-21-98	Slight No detectable use	Slight No detectable use
SIM3-Uplands			3-24-98 4-9-98 10-21-98	Slight Light (light old feed) Zero to slight	N/A N/A N/A
Jacks Pastures					
Jack 1 ⁴ - Cage 1	6/30 - 8/4	514	10-21-98	Slight to light	No data
Jack 1 - Cage 2			10-14-98	Light	Light
Jack 2 - Cage 1	8/5-8/25	342	10-28-98	Slight to light	Slight to light
Cow Camp Pastures					
Cow Camp 2 - upper field	4/18-4/23	60	10-28-98	Light	Moderate
Cow Camp 2 - lower field	6/29-7/28	312	10-28-98	Light	Light to moderate
Lower North Native					
Indian Jack Creek	3-19 - 6/25	2425	8/10/98 and 8/17/98	Slight to light	Slight to light
Lynn Creek			8/27/98	Light to moderate	Slight to light

¹ AUMs=Animal Unit Months or both public and private lands.

² Slight=1-20%; Light=21-40%; Moderate=41-60%; Heavy=61-80%; Severe=81-100%a.

³ SIM1 is located in the downstream-most pasture; SIM3 is located in the upstream-most pasture.

⁴ Jack 1 is located in the upstream most pasture; Jack 2 is located in the downstream most pasture.

* Note: Some of the utilization recorded for willows was the result of deer, particularly for inspections completed early in the growing season.



Figure 19. Maggie Creek, H-1. Utilization Cage. 10/28/98. *This pasture was grazed for about two weeks in late October in 1998. Use of herbaceous riparian vegetation was estimated as slight, while use on willows was estimated as moderate. Increased establishment of riparian vegetation within this field plays an important role in reducing any erosion potential associated with discharge flows.*



Figure 20. Maggie Creek, SIM1. Streamside Utilization Cage. 10/21/98. *Although this field was grazed for about one month in March of 1998, there was no detectable difference in use of grazed and ungrazed (caged) plants by October. Recovery of both the stream channel and associated riparian zone along this section of Maggie Creek is excellent as shown by stable, well vegetated streambanks and a deep narrow stream channel.*



Figure 21. Cow Camp 2 (upper field). 10/28/98. *This field was grazed for a limited time in April and for about one month in July. In 1998. Use was estimated as slight on herbaceous vegetation and moderate on willows by the end of October. This semi-wet sedge/rush community is naturally resilient to grazing and responds well to short duration use in July.*



Figure 22. Jack Pasture 1 (upper field). Utilization Cage. 10/28/98. *Grazing occurred mostly in July in 1998. Utilization of both herbaceous vegetation and willows was estimated as light. As with other large, naturally irrigated meadow communities within the MCWRP area, this field showed very little impact to short duration summer grazing.*



Figure 23. Jack Pasture 2. Utilization Cage. 10-14-98. *Grazing occurred for about three weeks in August of 1998. Utilization was estimated as slight to light on both woody and herbaceous vegetation. Although the headcut shown in the photograph has advanced upstream about one foot over the past two years, areas of bare soil are becoming increasingly colonized and stabilized with vegetation.*

Conclusions

Monitoring in 1998 has shown continued improvement of stream and riparian habitats in the MCWRP since implementation of the SOAP Mitigation Plan in 1993. As was evident in 1997, the application of prescription grazing in selected pastures in 1998 is proving to be compatible with Mitigation Plan objectives to improve and maintain good habitat conditions within the basin.

Although not all biological standards have been met in pastures scheduled for grazing, monitoring shows the types of grazing treatments being applied have little impact on stream conditions. Rather, lack of attainment of some criteria is a function of upstream sediment loads or a slower response rate for some stream segments. Of more importance is the demonstrated recovery both numerically and with photographs of both grazed and ungrazed pastures within the MCWRP area.

Recommendations

Evaluate attainment and/or maintenance of biological standards of key stream and riparian habitats identified in Appendix A of the SOAP Mitigation Plan (BLM 1993) in 2001. This date represents the maximum five years allowed between surveys by the Mitigation Plan (the last complete survey was in 1996).

Retake color infra-red photographs in 2003. This date represents the maximum five years allowed between aerial surveys by the Mitigation Plan (BLM completed a color infra-red flight of the area in 1998).

Initiate temperature monitoring studies on Maggie Creek as identified in the Mitigation Plan. This action item was never completed. As habitat for fisheries improves on Maggie Creek, it is important to monitor whether summer water temperatures are cool enough to support the expansion of cutthroat trout.

Eliminate hydrophytic cover standards for stations LJ-3 to LJ-5 (Jacks Pasture 1) and SIM1 (Lower Simon Creek Parcel). Monitoring plots are located either in dry gravel beds with no response potential or are now included within an exclosure. No other revisions to biological standards for the MCWRP area are recommended at this time over what was identified in the Riparian Monitoring Analysis completed by BLM in 1997.

Continue to prescribe grazing on the basis of Mitigation Plan goals and on the results of annual and long-term monitoring.

Continue to monitor livestock grazing utilization on an annual basis. Utilization studies and photographs in riparian habitats need to be collected for the following pastures in 1999: Lower North Native, Upper North Native, Jacks Pastures 1 and 2, Lower Creek Parcel, Simons 1-3 (Maggie Creek), Coyote Pasture (Maggie Creek), Cow Camp 2, H-1 (Maggie Creek) and H-7 (Maggie Creek).

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- BLM. 1997. Riparian monitoring analysis. South Operations Area Project Mitigation Plan, Maggie Creek Watershed Restoration Project. Elko Field Office, BLM, Elko, Nevada.

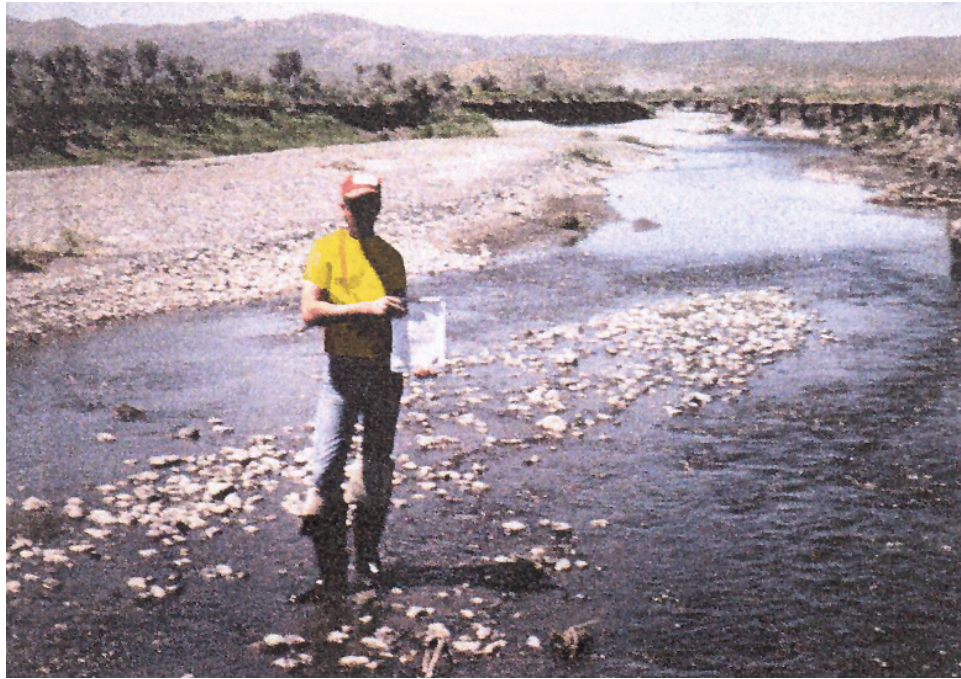
APPENDIX I

Description of Stream Habitat Parameters Monitored in 1998

Stream Habitat Parameter	Comments
Pool-Riffle Ratio (% optimum)	Comparison to optimum (defined as 50% pools, 50% riffles) is reasonable for Indian Jack and Lynn Creeks. For lower gradient streams such as Maggie Creek and the lower reaches of Indian Jack Creek the pool component may be higher than 50% as conditions improve. Pool-riffle ratio for moderate gradient streams should approach optimum as conditions improve; however, this variable is often influenced by flow conditions at the time of the survey.
% Pools Rated as Quality Pools	Pool quality should increase as conditions improve. A deeper, narrower channel provides scouring action for pool development, while streambank vegetation allows for shading and formation of stable undercut banks. This variable may be influenced by flow conditions at the time of the survey.
% Desirable Streambottom Substrates	Sediment on the streambottom should decrease resulting in a greater component of gravels and rubble as stream conditions improve. Occasionally this variable is influenced by low flows and high stream temperatures which can result in living or decomposed algae covering substrates.
Bank Cover (% optimum)	With few exceptions, streambank cover increases as conditions improve. Because of the availability of growing season moisture, riparian plants are quick to colonize areas of bare soil with changes in land use practices.
Bank' Stability (% Optimum)	With few exceptions, streambank stability increases as conditions improve. Although rocks can make banks stable, bank stability is often closely correlated to bank cover. Densely vegetated streambanks tend to be resistant to the erosive forces of water.
Riparian Condition Class (% optimum)	The average of bank cover and bank stability has proven to be an excellent indicator of stream condition in relation to grazing. As conditions improve, this variable almost always increases.
Stream Width/Depth Ratio	This parameter should decrease with improving conditions. Vegetation on streambanks trap sediment which provides the basis for well developed streambanks. Well developed streambanks allow for the formation of a narrow, deeper stream channel which in turn allows for cooler summer stream temperatures; overbank flooding resulting in floodplain storage and energy dissipation; and, constriction of water velocities resulting in pool development and sediment removal from substrates. For the most part, width to depth ratios of less than about 20 represent good conditions for the surveyed streams. A slightly higher width to depth ratio may be reasonable for Maggie Creek due to the fact that channel morphology for larger streams is less influenced by the riparian zone than it is for small streams.

Stream Habitat Parameter	Comments
Shorewater Depth	Shorewater depth should increase with improved conditions. As streambanks become more developed, the depth at the Shorewater interface increases. The deepest shorewater depths are associated with undercut streambanks. Shorewater depths of zero are typically associated with wide, shallow channels with "laid back" exposed streambanks. Even a small increase in this variable is a strong indicator of improving conditions.
Bank Angle (degrees)	In the absence of channel entrenchment, bank angles typically become steeper with increased streambank development associated with an improving riparian zone. Completely laid back banks with no development whatsoever have angles approaching 180 . Conversely, very well developed undercut banks have angles of less than 90' For entrenched channels, bank angles first need to become flatter before a new floodplain can form and recovery can occur. The trend toward steeper bank angles observed for MCWRP area streams is associated with improving conditions, rather than channel entrenchment with the possible exception of Lynn Creek.
Bank Overhang (bank undercut)	Development of undercut banks typically occurs in the more advanced stages of recovery. Healthy, well developed riparian zones are necessary to hold streambanks in place in the face of the erosive powers of water. Even a small increase in presence of undercut banks is a strong indicator of improving conditions especially in relation to fisheries.
Woody Vegetation Overhang	This parameter relates to the amount of woody riparian vegetation overhanging the water column. Detectable changes in this variable occur primarily in willow dominated stream systems. As the riparian vegetation increases, the amount of woody vegetation directly over the water column should increase. Overhanging woody vegetation provides shading and cover for trout. Although this parameter is a good indicator of improvement on willow type streams, a larger sample size than what is typically used for stream survey is necessary to detect changes over the short-term (five years or less).
Substrate Embeddedness	As stream conditions improve, substrate embeddedness declines. A decline in sediment input combined with the scouring action of constricted flows (resulting from a narrower, deeper channel) results in decreased levels of sediment around gravels and rubbles. This is especially important for trout, which depend on clean gravels for spawning. Excellent improvement in embeddedness was observed for streams in the MCWRP area.

APPENDIX A-3
STREAM RESTORATION PHOTOGRAPHS



Maggie Creek. Station 4, Transect 1. 7/5/86. Degraded habitat conditions including a wide, shallow channel; excessive deposition of gravels and fine sediments; lack of riparian vegetation; and, absence of a functional floodplain characterized much of Maggie prior to implementation of the South Operation Area Project (SOAP) plan.



Maggie Creek. Station 4, Transect 1. 7/1/99. Stream and riparian habitat conditions have improved dramatically since the SOAP Mitigation Plan was implemented in 1993. Although this area is still grazed by livestock, changes in the timing and duration of grazing have resulted in development of a much narrower, deeper stream channel as well as stable, vegetated streambanks. Most importantly, Maggie Creek now has a functional, hydrated floodplain and a healthy riparian zone.



Coyote Creek. Station 2, Transect 2. 8/18/77. Prior to the implementation of the South Operations Area project (SOAP) Mitigation Plan, habitat conditions along Coyote Creek were extremely poor as shown by a shallow, exposed channel and nearly complete absence of streambank vegetation. Under these conditions trout are susceptible to excessive summer water temperatures as well as lethal icing conditions in winter.



Coyote Creek. Station 2, Transect 2. 9/20/99. Changes in grazing management initiated through the SOAP mitigation Plan have allowed for the vigorous growth and establishment of a healthy willow riparian zone. As shown in the insert, Coyote Creek is not characterized by stable, well vegetated streambanks and a much narrower and deeper stream channel. The result is greatly improved habitat conditions for the threatened Lahontan cutthroat trout.

APPENDIX B
VISUAL CONTRAST RATING WORKSHEETS

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

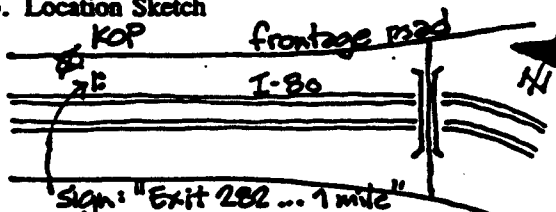
Date 17 October 1997

District Elko

Resource Area Elko

Activity (program) mining

SECTION A. PROJECT INFORMATION

1. Project Name Newmont SOAPA	4. Location Township 33N Range 53E Section 19	5. Location Sketch 
2. Key Observation Point #1 I-80 1 mi E of E. Carlin Interchg		
3. VRM Class II		

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	flat to rolling w/angular forms @ mine, hwy & R.R.	simple-indisinct	angular-horizontal
LINE	horizontal-weak diagonal diagonal stronger in after noon	weak	broken-irregular-indistinct
COLOR	chalky buff + reddish tan	brown-tan foreground gray/tan/buff/yellowish	black, dark gray, yellows, white, brown + tan
TEXTURE	smooth-uniform	fine-subtle uniform-random	random-clumped

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	flat-angular	same as above	angular-horizontal
LINE	horizontal		broken-irregular-indistinct
COLOR	light gray, tan, brown		yellow-white-brown-tan
TEXTURE	smooth-uniform		random-clumped

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1. DEGREE OF CONTRAST		FEATURES												2. Does project design meet visual resource management objectives? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No (Explain on reverse side)			
		LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)							
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None				
ELEMENTS	Form			X				X				X					
	Line				X				X				X				
	Color			X				X				X					
	Texture			X				X				X					

3. Additional mitigating measures recommended
☐ Yes ☒ No (Explain on reverse side)

Evaluator's Names Dehn Solomon Date 10-17-97

SECTION D. (Continued)

Comments from item ^D2.

Changes consist of increased height and lateral extent of embankments and additional buildings.

Additional Mitigating Measures (See item 3)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

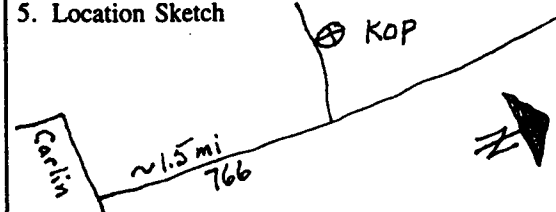
Date 17 October 1997

District Elko

Resource Area Elko

Activity (program) mining

SECTION A. PROJECT INFORMATION

1. Project Name Newmont SOAPA	4. Location Township 33N Range 52E Section 22	5. Location Sketch 
2. Key Observation Point #4 Maggie Cr. Rd. / Carlin Landfill Rd.		
3. VRM Class II / IV		

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	flat to rolling angular/geometric	indistinct	irregular - blocky
LINE	horizontal - angular	weak - undulating	weak
COLOR	chalky buff - gray pastel reds	brown - tan - buff	buff - white - gray
TEXTURE	fine - patchy - random	fine	discontinuous - random

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	flat to rolling angular/geometric	same as above	irregular - blocky
LINE	horizontal - angular		weak
COLOR	chalky buff - gray pastel reds		buff - white - gray
TEXTURE	fine - patchy - random		discontinuous - random

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1. DEGREE OF CONTRAST		FEATURES												2. Does project design meet visual resource management objectives? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No (Explain on reverse side)				
		LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)								
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None					
ELEMENTS	Form		X														3. Additional mitigating measures recommended <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No (Explain on reverse side)	
	Line			X				X				X						
	Color			X				X				X						
	Texture			X				X				X						
Evaluator's Names Dehn Salomon																		Date 10-17-97

SECTION D. (Continued)

Comments from item 2.

Change to consist of increased lateral extent of leach pads and increased height of WRDFs at left and right margins of facility site. Change will attract attention but should not have significantly greater dominance than existing operations. Steam plumes from roaster and cooling towers have strong contrasts, but are intermittent.

Note: area is in Class II Highway corridor but separated from highway by ridge. Views from KOP are Class IV with Class III in background.

Additional Mitigating Measures (See item 3)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

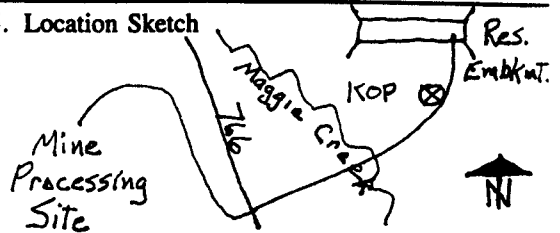
Date 17 October 1997

District Elko

Resource Area Elko

Activity (program) mining

SECTION A. PROJECT INFORMATION

1. Project Name Newmont SOAPA	4. Location Township 34N Range 52E Section 32	5. Location Sketch 
2. Key Observation Point #6 Maggie Creek Ranch Reservoir access rd.		
3. VRM Class IV		

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	flat to rolling w/ angular geometric forms at mine	indistinct	angular - horizontal
LINE	horizontal, angular, diagonals at mine	weak	irregular, broken - plumes have strong contrast
COLOR	brown - tan - buff	brown - tan - buff	brown - gray - white plumes have strong contrast
TEXTURE	fine - patchy - random	fine	random - clumped

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	flat, rolling, angular at mine	Same as above	irregular, angular, horizontal
LINE	horizontal, angular		irregular, indistinct
COLOR	brown, tan, buff		brown, gray, white
TEXTURE	fine, patchy, random		random, clumped

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1. DEGREE OF CONTRAST		FEATURES												2. Does project design meet visual resource management objectives? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No (Explain on reverse side)			
		LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)							
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None				
ELEMENTS	Form		X					X				X					
	Line				X			X				X					
	Color				X			X				X					
	Texture				X			X				X					

Evaluator's Names
Dehn Solomon

Date
10-17-97

3. Additional mitigating measures recommended
☐ Yes ☒ No (Explain on reverse side)

SECTION D. (Continued)

Comments from item 2.

Change to consist of increased lateral extent of leach pads to the south; increased height of WRDF to the west of KOP. Changes will not have significantly greater dominance than existing forms.

Additional Mitigating Measures (See item 3)
